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THE

DENTAL COSMOS:

A

MONTHLY RECORD OF DENTAL SCIENCE.

Devoted to the Interests of the Profession.

EDITED BY

EDWARD C. KIRK, D.D.S.

Observe, Compare, Reflect, Record.

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THE

DENTAL COSMOS.

VOL. XXXIV. PHILADELPHIA, JANUARY, 1892. No. 1.

ORIGINAL COMMUNICATIONS.

SENILE ATROPHY OF THE UPPER JAW.

BY CARL HEITZMANN, M.D., AND FRANK ABBOTT, M.D., NEW YORK, N. Y.

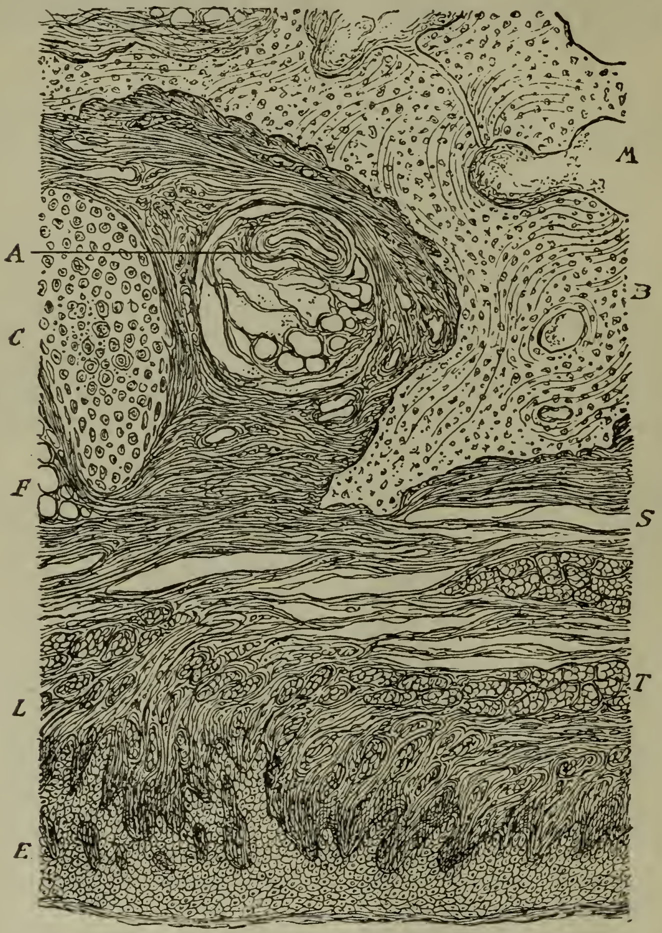
(Read before the American Dental Association, Saratoga Springs, N. Y., August 7, 1891.)

WITH advancing age the human organism is reduced in size and weight; the more so, as a rule, after the "threescore years and ten" have passed. The whole body shrinks, as well as all its individual tissues. Age itself is disease. The old Roman proverb says, "And the aged returns to childhood, both mentally and physically." The questions which we have tried to solve are, In what does this atrophy take place? What are its visible signs under the microscope?

Through the kindness of Dr. Emmons Paine, superintendent of the insane hospital in Westborough, Mass., we came into possession of the upper jaw of a woman, who died at the age of seventy-five years. The jaw, immediately after removal, was placed in a one-half of one per cent. solution of chromic acid, in which it remained for several weeks, for the purpose of softening the bony parts. We lay stress upon this fact, since previous researches upon senile bone have been made upon dried specimens, by which method we are convinced that the results of microscopical research must have been marred, if not rendered futile. The whole thickness of this jaw, from the oral to the nasal surface, was not more than from four to five millimeters; the oral surface was perfectly smooth, without a trace of a tooth or a socket. A slight indication of the central raphe could be seen. Vertical sections through it give striking pictures of far-advanced senile atrophy. (See Fig. 1.)

The stratified epithelium of the oral mucosa terminates in an almost even line without the least indications of previous gums, the sum total of the epithelium being considerably narrowed. The papillæ, so prominent in the region of the gums in a normal condition, are still present, but considerably shortened and narrowed. The fibrous connective tissue is markedly reduced in its total quantity, as well as in the width of its bundles, as seen best in their transverse section. The connective tissue, including that of the previous gums and that of the periosteum, runs in an almost horizontal course, being interlaced by bundles and tracts at an almost rectangular direction. It is traversed by numerous fissures, or slits, which were probably caused by mechanical injury in the process of cutting. This feature in otherwise perfect sections would indicate that the connection of the bundles is an extremely delicate one. Fat-tissue, so abundant both in the periosteal connective tissue and the medullary spaces of the cancellous bone of the jaws of the young and middle-aged, is extremely scanty. The bone itself produces only thin ledges bordered by an irregularly corroded line, without a distinction between compact and cancellous structure. The medullary spaces are greatly varying in size, and

FIG. 1.



ATROPHIED UPPER JAW. VERTICAL SECTION.—*E*, stratified epithelia of mucosa of oral cavity; *L*, longitudinal bundles of fibrous connective tissue; *T*, transverse bundles of fibrous connective tissue; *S*, spaces in connective tissue; *F*, fat-globules; *C*, hyaline cartilage; *A*, artery, probably in a previous alveolar canal; *B*, cancellous bone; *M*, Medullary space. × 50.

filled either with a delicate fibrous connective tissue, or with granular matter, probably disintegrated protoplasm. The most striking feature is the presence of portions of hyaline cartilage, at the same height with the bony tissues left, which goes far to prove that the cartilage has grown from a previous bony structure, and in a measure is replacing it. As is well known, hyaline cartilage is present in the lower jaw only at the earliest stages of embryonal life, up to the eighth week of development. Around and from this so-called primordial cartilage bone-tissue develops, and in the third month of intra-uterine life all vestige of cartilage is lost. How much hyaline cartilage has to do with the development of the upper jaw, we are unable to tell. Most anatomists consider the upper jaw as having sprung from fibrous connective tissue, in a way similar to that of all flat facial and skull bones. However this may be, it is certainly remarkable that hyaline cartilage should reappear in the upper jaw of the aged, proving, as it were, that advanced age is a recurrence of childhood, even to intra-uterine life.

Let us now consider the senile changes of the tissues involved in the formation of the upper jaw.

1. *Epithelium.*—As mentioned before, the layer of stratified epithelium has been considerably reduced in bulk, although its three constituent portions are still recognizable, the main mass being made up of cuboidal epithelia, whereas the outermost or horny layer is composed of several rows of flat epithelia, and the border toward the connective tissue is established by a single row of columnar epithelium. (See Fig. 2.)

Horizontal sections through the mucosa show the thinning of the epithelial layer even better than vertical ones ; in the former, also, the row of columnar epithelia is better marked than in vertical sections. Most of the epithelia are much less conspicuous than in childhood or middle age. This may be accounted for, first, by the fine granulation of both the protoplasm and the nuclei ; secondly, by a reduction in the amount of the intervening cement-substance ; and thirdly, by a noticeable reduction of the bulk of each epithelium. An additional feature is that many of the original epithelia seem to have split up into smaller lumps. In many instances, only faintly-outlined nuclei are to be seen, so closely packed together that but little intervening protoplasm is discernible.

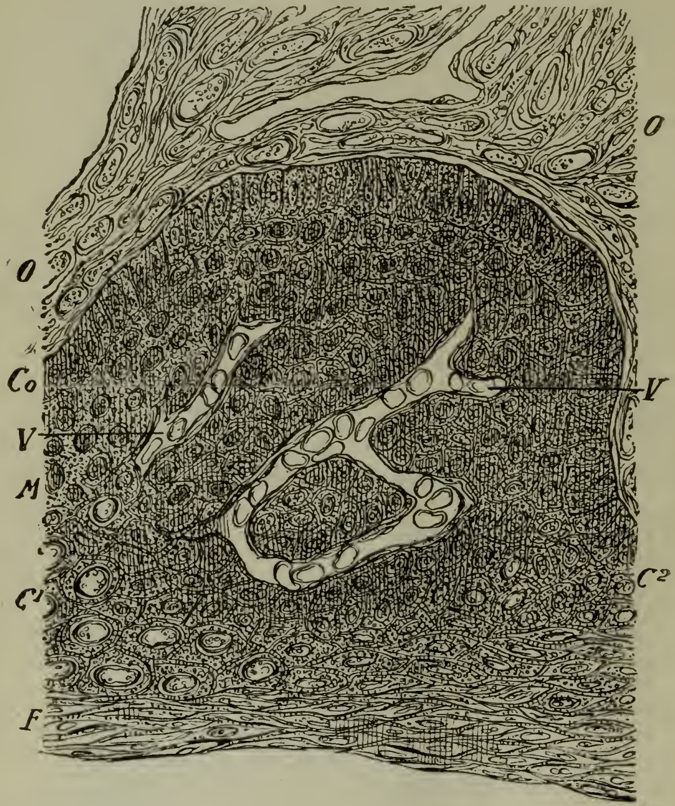
In many cases cement-substance is lacking altogether, to such an extent that the impression of multinuclear bodies is produced ; wherever cement-substance is present, though its ledges be ever so narrow, the delicate thorns traversing it are invariably traceable.

In some places, however, the nuclei of the cuboidal epithelia are almost solid glistening lumps, such as we are accustomed to see in either a juvenile or an inflamed condition of epithelium.

Broader epithelial valleys show in vertical sections narrow crevices, each holding a minute capillary blood-vessel. This may be explained by the shrinkage of previous papillæ ; though this view is hardly tenable in the face of the fact that all well-pronounced papillæ are supplied with a small number of blood-vessels. The view is more probable that capillaries with a little accompanying connective tissue have grown into the epithelial layer from without, thus causing, or at least assisting in, the atrophy of the epithelium.

This much is certain, that the reduction of the sum-total of the covering epithelium is caused mainly by a reduction in the size of each epithelial body. We are, however, unable to say where the lost material has gone, unless it was absorbed by newly-formed capillaries grown into the epithelial layer. A transformation of the epithelia, first into medullary corpuscles, and afterward into connective tissue, a process so common in inflammation and the formation of tumors, could nowhere be satisfactorily proven in our specimens, and seems to be little probable, since, as stated above, the columnar epithelia appear unbroken; possibly mastication has been more or less instrumental in removing layer after layer of epithelia.

FIG. 2.



ORAL EPITHELIUM OF SENILE UPPER JAW. VERTICAL SECTION.—*F*, layer of flat epithelia; C^1, cuboidal epithelia with solid nuclei; C^2, cuboidal epithelia of small size, with small vesicular nuclei; *M*, multinuclear layers of protoplasm; *Co*, columnar epithelium; *V*, *V*, capillary blood-vessels traversing the middle epithelial layer; *O*, *O*, myxofibrous connective tissue of oral mucosa. × 600.

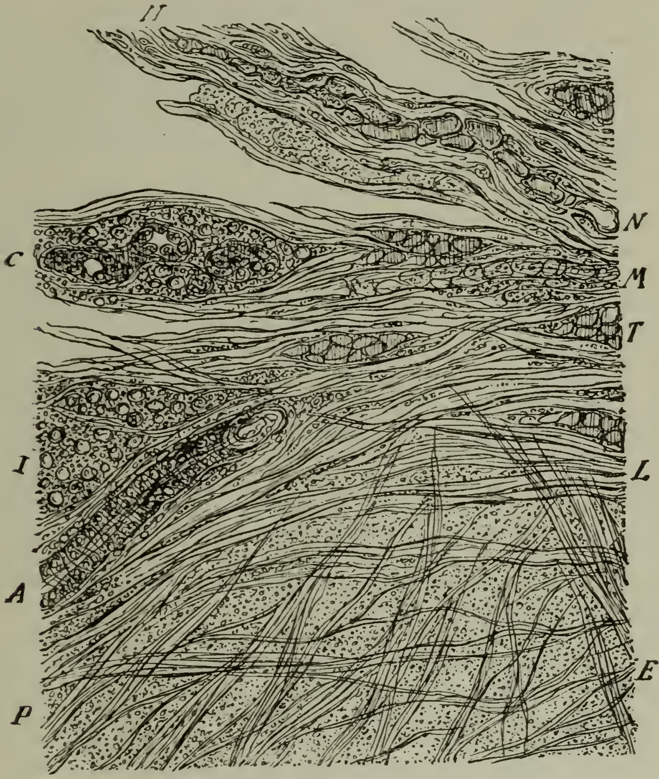
2. *Fibrous Connective Tissue.*—The senile changes of the oral mucosa are explicable only upon the fact, established by one of us in 1873, that the protoplasmic bodies lie between the bundles of the fibrous connective tissue, and the bundles themselves are not alto-

gether inert glue-yielding basis-substance, but are traversed by an extremely delicate, almost rectangular, net-work of living matter. The bundles, therefore, are possessed of life as well as protoplasm itself.

Close around the epithelia, and in the remnants of the papillæ, we notice delicate bundles holding a large number of finely granular bodies, and but a small number of capillary blood-vessels.

This tissue certainly differs from what we are accustomed to see in youth and in middle age. It may be termed myxofibrous connective tissue, such as is seen in tumors of the skin and mucous layers, termed myxofibromata. This tissue exhibits the same aspect, both in vertical and horizontal sections of the senile jaw. (See Fig. 2, *O*, *O*.)

FIG. 3.



ORAL MUCOSA OF SENILE UPPER JAW. HORIZONTAL SECTION.—*L*, longitudinal bundles of fibrous connective tissue; *T*, transverse bundles of fibrous connective tissue; *N*, *N*, medullated nerve-fiber; *A*, artery; *C*, capillary blood-vessel partly narrowed, partly obliterated; *M*, bundle of fibrous connective tissue split up into medullary corpuscles; *I*, cluster of indifferent corpuscles; *E*, elastic fiber; *P*, finely granular protoplasm. × 600.

The fibrous tissue proper is, as above mentioned, noticeable by the small size of its constituent bundles, as shown both in their longitudinal and transverse sections. The changes of this tissue and its tenants, which are obviously the result of advanced age, are really surprising. (See Fig. 3.)

The bundles quite frequently show, under lower powers of the microscope, a faint granulation, which, if viewed with high powers, proves to be the reticulum of living matter already alluded to. This goes to prove that the tissues, especially their matrices, or basis-substances, remain alive to the last. Some of the longitudinal bundles appear split up into faintly-marked medullary corpuscles, especially in their longitudinal sections (Fig. 3, *M*). Here, evidently, a slight liquefaction of the glue-yielding basis-substance has occurred, leading, as it were, to a rejuvenescence of the bundle, *i.e.*, a reappearance of those embryonal corpuscles which in the earliest stage of development have built up the bundle. In other places clusters of glistening homogeneous globules make their appearance, scattered in a finely granular protoplasm. These globules are even smaller in size than the medullary corpuscles from which ameloblasts originate. (Fig. 3, *I*.) Nests of this description are similar to those seen in inflammation of the fibrous connective tissue, but we conclude are not inflammatory nests in our specimens, owing to their diminutive size and scantiness. There is no doubt in our minds that, exactly as in the process of inflammation, a recurrence of the juvenile or medullary condition has taken place. There is no doubt either that a liquefaction of the basis-substance has taken place in these nests, leading first to a reappearance of protoplasm, and afterward to an increase of the living matter thereof, up to the formation of the glistening lumps under consideration. The nests are still traversed by faint vestiges of the previous bundles, the same as we observe in early stages of inflammation.

The thinning of the bundles is unquestionably caused by their gradual transformation into protoplasm, since the interstices are found, in many instances, widened and filled with protoplasm of a finely granular character, which means a small amount of living matter. The ultimate fate of the bundles is, that the basis-substance is liquefied, and nothing is left but the framework of elastic fibers which have previously bordered the bundles, and which, on account of their chemical composition, are less destructible than ordinary glue-yielding basis-substance. (Fig. 3, *E*.)

The result is that where formerly dense fibrous connective tissue was present a faintly granular protoplasmic mass is now seen, the living matter of which is scanty and pale, apparently on account of a hydropic infiltration of the same. This will explain the flabbiness of the tissues of the aged on the one hand, and the gradual loss of living matter on the other. For we realize that particles of living matter with serum imbibed will be gradually detached from the mother soil, disintegrated, and taken back into the circulation through the scanty blood- and lymph-vessels left. The general shrinkage of the body thus becomes intelligible.

3. *Blood-Vessels.*—The fibrous connective tissue of the oral mucosa is, as is well known, freely supplied with blood-vessels—arteries, capillaries, and veins—during the ascending period of life, while it holds surprisingly few vessels in advanced age. In our specimens we have a good opportunity to trace the manner in which the blood-vessels perish. Smaller arteries show in their muscular walls an augmentation of the nuclei to such an extent that the spindles of the smooth muscle-fibers become replaced by rows of minute glistening globules (Fig. 3, *A*). An artery may thus become so changed in

its aspect that it were impossible to tell its original character, except through its attachment to a less altered artery of which it forms a branch. The endothelium of the inner coat likewise is enlarged and more or less crowded with coarse granules of living matter, by which means the caliber becomes at first narrowed and ultimately choked. The fibrous connective tissue of the adventitial coat behaves in a way similar to that of the mucosa generally, *i.e.*, it is gradually reduced to its juvenile or embryonal condition. After an artery has thus become impermeable to the current of the blood, it is in turn transformed into a solid tract of fibrous connective tissue, and as such is subject to the changes above described. The capillaries being composed of a single endothelial wall only, are easily traceable in their course to final obliteration. The endothelia swell up, become coarsely granular, and, by their bulging, the caliber is narrowed and rendered star-shaped. The augmentation of the living matter proceeds up to a complete occlusion of the caliber, such as is often seen in the process of inflammation. The result is a solid cluster of protoplasm in place of the previously hollow vessel. It seems that the nests of the glistening globules above alluded to are mostly present in the neighborhood of blood-vessels, or in places where blood-vessels had previously been. (Fig. 3, *C.*) Those who favor the emigration theory in inflammation must be at a loss to explain the appearance of indifferent or inflammatory corpuscles in places where the blood-vessels have perished. With us who urge the origin of such corpuscles both from the protoplasm—respectively its living matter and the living matter of the basis-substance—the images furnished by the microscope are explicable without any difficulty. That veins are gradually being obliterated in a way similar to that of arteries and capillaries is almost a matter of course, although we have not been able to trace this process directly in our specimens.

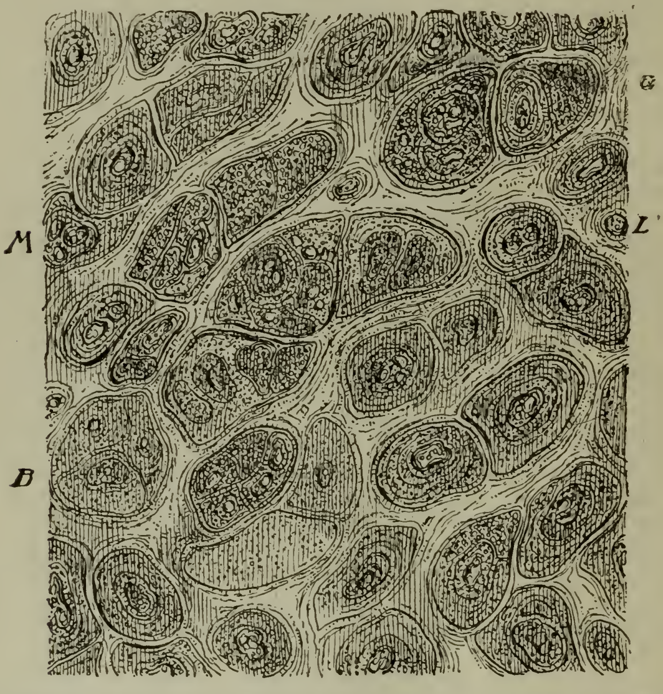
4. *Nerves.*—Here and there we meet with medullated nerves, recognizable as such by their course and their connection with other little or entirely unchanged nerves, which exhibit striking changes. Such changes are usually met with in the process of neuritis ; but in this instance, neuritis not being present, they must be attributed to senile changes. There is nothing surprising in the similarity between inflammation and senile metamorphosis, since both are essentially a return to the juvenile or medullary condition. Some medullated nerves appear to be broken up into glossy lumps, owing to a splitting up of the myelin ; at the same time the parallelism of the contours is lost, and the nerves show spindle-shaped widenings, alternating with narrow tracts. (Fig. 3, *N*, *N.*) The shining lumps are, probably at least, transformed into protoplasmic or medullary bodies, which in turn are transformed into spindles, and ultimately into fibrous connective tissue. Thus both the constrictions in the course of the nerve and the augmentation of the perineurium become intelligible, as well as the final loss of nerves, through their transformation into fibrous connective tissue. As to the changes of the axis-cylinders, we have nothing to say, since medullated nerves are unfit for the study of this particular portion.

5. *Cartilage.*—The appearance of hyaline cartilage (Fig. 4) in a senile jaw is, as we have before remarked, a most surprising fact, going far to prove that rejuvenescence of the tissues takes place in old age. Hyaline cartilage is, no doubt, a transient or provisional tissue in

early embryonal life, and the same seems to be the case in declining age, since it appears as a mere intermediate tissue between previous bone and the ultimate tissue, *i.e.*, fibrous connective tissue.

Hyaline cartilage in this case appears as a thin rounded-off plate, characterized by small and flat cartilage-corpuscles along the borders, whereas the central portions are made up of comparatively large and coarse granular bodies, if viewed with lower powers of the microscope. The borders of this tissue are intimately connected with fibrous connective tissue. (See Fig. 1, *C*.)

Fig. 4.



Cartilage from Senile Jaw.—*M*, medullary corpuscles; *L*, small lumps of living matter; *B*, cartilage-corpuscles transformed into basis-substance; *G*, cartilage-corpuscles, partly coarsely and partly finely granular. × 800.

The basis-substance is everywhere scanty, and partly hyaline, partly finely striated. Higher powers reveal a surprising variety in the sizes and shapes of these bodies. From the smallest lump (see Fig. 4, *L*) there are transitions to large oblong corpuscles, mostly arranged in groups and clusters. (See Fig. 4, *M*.) The shapes vary from small globules up to large protoplasmic masses, flattening one another, where they are arranged like twins or triplets. Similar formations can be seen in almost any portion of normal cartilage, and such groups have been looked upon by histologists of olden times as striking examples of cell-division. Now we are aware that twin formations are visible in the earliest as well as in the latest formations of this tissue, and mean merely a grouping from the very origin, but no division. That the, comparatively speaking at least, active tissue should show lively division is beyond comprehension. Besides, how could the dense and tough basis-substance yield to make room for the rapid growth and division of cells? Since the fact is established that the basis-substance of hyaline cartilage is traversed by living matter, as well as the protoplasmic bodies themselves, the changes of the forms and sizes of the corpuscles are easily comprehended. Since the borders of the newly-formed cartilage exhibit small and finely granular corpuscles, we are justified in assuming that the corpuscles in this situation are at rest. The central portions, on the contrary, show coarsely granular bodies and clusters of medullary corpuscles, which seems to indicate that the latter part is breaking up into embryonal tissue in order to produce fibrous connective tissue, such as arises from a direct breaking up of bone-tissue. Intermixed with fully developed cartilage-corpuscles we meet those which show only a central nucleus or nucleolus, while the protoplasm is extremely pale, and differs from the surrounding basis-substance only by its slightly increased refraction. According to Spina, these forms mean a gradual change of cartilage-corpuscles into basis-substance, which view seems to be well founded.

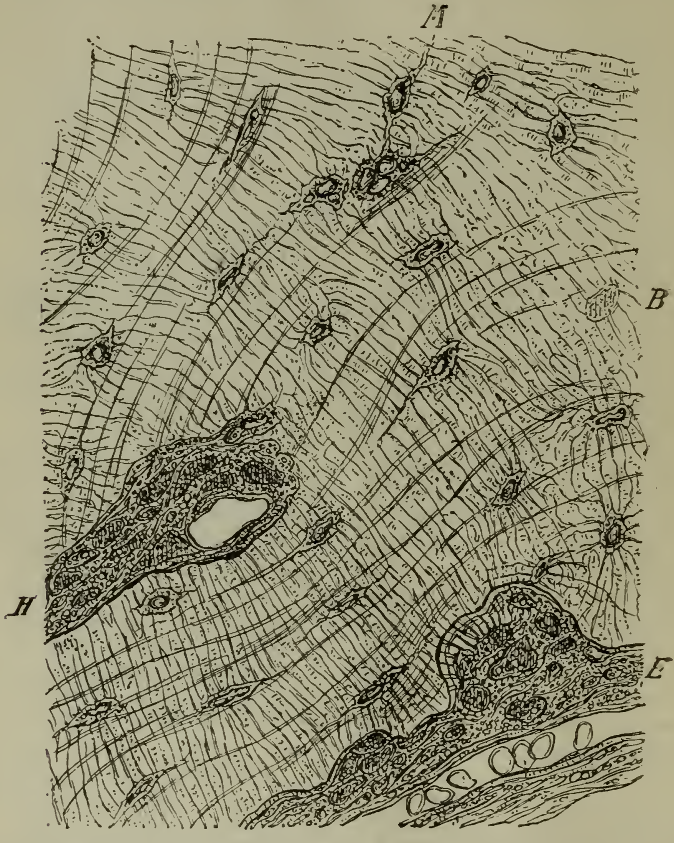
Basis-substance originates in protoplasm, and may return to the protoplasmic state at any time. This tissue strongly supports the view of the changeableness of protoplasm, and as strongly contradicts the old-fashioned views of the stability of cells. A variety in the forms of cartilage-corpuscles, as we have just described, is seen in the transitional cartilaginous tissue known as "provisional callus" of shaft-bones.

6. *Bone-Tissue.* (See Fig. 5.)—After individual teeth have been lost, their sockets, after a while, disappear, and after all the teeth are gone the whole alveolar process fades away. This process, so common, is known by the term "absorption," but we are not satisfied with the idea conveyed by this expression, for it is evident that a hard tissue like bone cannot be disposed of with so little ceremony. It would seem more reasonable to expect that it must first be reduced to its protoplasmic condition, which as such is more readily disposed of. The results of our studies in this case fully justify us in assuming that such changes do take place. Both the cortical and the spongy portion are much reduced,—the former, in some places, to a complete disappearance, the latter by a diminution of the bulk of its trabeculæ. The way in which this is accomplished is twofold. Firstly, the bone-tissue is attacked upon its periphery, through the attachment of the periosteum, and secondly, by an enlargement and new formation of Haversian canals in a previously perfectly-formed mass of bone. The borders are corroded, jagged, and amply provided with bay-like excavations, such as we see so frequently in the process of inflammation of bone. The bays usually contain protoplasmic bodies of varying sizes and shapes, but we have nowhere met with multinuclear bodies or giant cells, which Kölliker termed in a rather humoristic way "bone-breakers" or "osteoklasts." The origin of these medullary corpuscles is occasionally traceable from previous bone-corpuscles that have been deprived of their surrounding basis-substance. (See Fig. 5, *E.*)

Since in one connection the basis-substance is, though infiltrated with lime-salts, just as viable as are the bone-corpuscles themselves, we can readily understand that after a dissolution or liquefaction of the basis-substance protoplasmic bodies will reappear. The next stage is the elongation of the medullary corpuscles into spindles, and thence into fibrous basis-substance, with a simultaneous new formation of capillary blood-vessels.

The new formation of Haversian canals proceeds in exactly the same manner as in osteitis, although on a much smaller scale. First a bone-corpuscle, or several neighboring ones, become enlarged by a liquefaction of the surrounding basis-substance. Next the living matter of such corpuscles increases in glistening homogeneous lumps. Some of the connecting canaliculi are widened into broad canals, the tenants of which increase in bulk. (See Fig. 5, *M.*)

Fig. 5.



Senile Changes of Bone of Upper Jaw.—*E*, border of bone-tissue jagged and showing bay-like excavations; *M*, bone-corpuscles broken up into medullary tissue; *H*, enlarged Haversian canal; *B*, bone-corpuscles transformed into basis-substance. × 800.

Thus protoplasmic masses appear in a solid basis-substance, in which, by a hollowing of the living matter, new capillaries are produced, as one of us has described, in the process of osteitis, in 1872. An already-formed Haversian canal is widening by continual melting down or dissolution of the adjacent basis-substance, with a gradual reappearance of embryonal or medullary corpuscles (Fig. 5, *H*), the ultimate destiny of which seems to be the production of fibrous connective tissue. This tissue at last is liquefied into protoplasm in a manner before described. In fact, the widened medullary spaces hold mainly such protoplasm, with but a few fat-globules.

An important question finds solution in the study of senile bone, viz : that of interstitial growth. Most modern histologists hold the opinion that bone-tissue grows by super-addition from without by apposition. A few writers, however, claim that bone may also grow by an increase of the basis-substance between the already-formed bone-corpuscles, which view seems to find support in the fact that the bone-corpuscles in old animals are farther apart than those in the young. Our studies enable us to account for this apparent interstitial growth as follows : It is a fact that with advancing age bone-corpuscles become fewer in number, the reason for which is that many of them are transformed into basis-substance, the same as Spina has claimed that cartilage-corpuscles are. Here and there we meet with a pale, finely granular bone-corpuscle without any vestige of a nucleus, and a refraction differing but slightly from that of the surrounding basis-substance. (See Fig. 5, *B*.)

Obviously a nucleated bone-corpuscle has changed into a finely granular protoplasmic body, which means an approach to glue, and subsequently to calcification. In looking over the tissue changes from the earliest embryonal life to the approaching physiological end of the individual, one must arrive at the conclusion that there is not for a moment absolute rest in the tissues ; temporarily, single protoplasmic bodies may make their appearance, such as we see in odontoblasts and ameloblasts. Temporarily, tissues may come into existence, such as cartilage, which soon afterward is lost, or, speaking correctly, becomes transformed into other tissues. So long as life lasts, protoplasm and the tissues sprung therefrom are unstable.

All tissues arise from protoplasm, or its medullary or indifferent corpuscles, and all tissues return to this embryonal or medullary state before they are absorbed.

Origin and decline show a striking similarity, and what is between the ''threescore years and ten'' is struggle and change of the whole person, as well as of all its constituent parts, the tissues.

THE ETHNOLOGY OF THE FACE.

BY ALTON H. THOMPSON, D.D.S., TOPEKA, KANSAS.

RECAPITULATION.

In previous articles of this series of studies of the human face,* it was observed that the face, being the ''mirror of the soul'' and the seat of expression *par excellence* of the mental processes and of the emotions, is worthy of our most devoted study and careful research ; and that this study is of especial value to dentists, whose operations upon the teeth affect the expression of the face, and who are so often called upon to restore its lost parts and recall youthful form and natural expression.

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* DENTAL COSMOS, vol. xxxi, 1889, p. 846 ; vol. xxxii, 1890, pp. 85, 169.

We observed the differences between refined and brutal faces, and the influences that have brought these about. Also, that the face is the most important part of the physiognomy of the individual, as being the most expressive, and that the movements of facial expression, when reduced to a scientific basis, are but a primitive sign-language which has become inherent. It is the expressional duty of the face to symbolize character, and these symbols are easily read by everyone, as they are not occult but open and plain. Also, that there is nothing in Lavater's fantastic system of character-reading, or in any other system which pretends to read character by mere association of features and faculties. Such pseudo-science is now obsolete and worthless.

We studied also the evolution of the face,* and observed that though the path of the descent of man is obscure, the origin and evolution of the face can be followed, if mainly by analogy. The structures of the face arose from its parts having been erected for the accommodation of the special sense-organs, and upon these foundations the facial features were constructed and facial expression became possible. The invertebrate animals have the special sense-organs scattered over the entire body, so that there is really no face, strictly so called, until we reach the vertebrates, where the four special senses are located within a limited area upon the front of the head. The study of the face in the lower vertebrates shows that there is little or no expression in those forms, although the eye becomes expressive very early in the scale. But in the higher mammals the facial features gradually attain the power of expressing the emotions. In the higher apes, as we should expect, the closest approach is made to man, and the face becomes all at once the special seat of expression, and the apes come very close to man in very many particulars of expression.

In the embryological record † the story of descent is more continuous, clear, and connected than in the comparative record, although both are similar and one is but a repetition and recapitulation of the other. The history of the origin and evolution of the human face is most readily followed in the embryological record, and is as elaborate as its importance demands.

In our study of the descent of expression ‡ we noticed how close we are to the animal kingdom. From Professor Cope's observations on the quadrumanous and embryological survivals and remains in the human features, we elaborated a philosophy of expression which accounts for many peculiarities in the faces of men and races. Some features remain more or less embryonic and infantile in maturity, and others bear a decided resemblance to primary animal types, especially with the quadrumanous and anthropoid forms. Other features are much developed or accelerated in man, and again some are much reduced, as compared with the lower primates. The quadrumana furnish many suggestions as to the origin of the human features, and supply clues to some of the intricate problems of human physiognomy. A study of faces from photographs was undertaken, the features separated and classified, and a comparative study made of each of the features. Some interesting results were obtained, which were worked out at length. A study of the movements of expression shows that many of the highly wrought expressive movements of the face in man find their origin in crude expressions in the quadrumana. As Darwin says, "the chief expressive actions exhibited by man and the lower animals are now innate and inherited: they come from the earliest days and are quite beyond control, and are not learned by the individual."

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* DENTAL COSMOS, 1890, pp. 633, 683.

† Ibid., 1890, p. 757.

‡ Ibid., 1891, pp. 188, 256.

Having followed the subject of the human face up through its zoological and comparative branches, touching upon its physiology and psychology, we come now to the study of the face in man. We must begin with the first step, the races of man, and investigate what might be called the ethnology of the face, studying its variations and peculiarities in different races and peoples.

THE RACES OF MANKIND.

Zoologically, man has a genus to himself, *Homo*, in which there is but one species, *Sapiens*. But there are many and some very marked varieties in this species, and it has at times been a much debated question among anthropologists as to whether or not this species should not be divided into sub-species, at least, for the anatomical differences between the highest and lowest races (as the lowest Negro or Australian and the highest European) are sometimes very great. It is generally agreed, however, that there are several distinct varieties of the race which are sufficiently well marked as to be almost worthy the dignity of sub-species. Professor Flower is of opinion,* after careful study of the subject for many years, that there are three distinct varieties or sub-species of mankind,—first, the Caucasian; second, the Mongolian; third, the Ethiopian; and that all the varieties in Europe, Asia, and Africa have arisen from these. Thus, these may be divided as follows:

1. The Caucasian or white type includes,—
    (*a*) The Xanthochroi (or blonde races).
    (*b*) The Melanochroi (or brunette races).
2. The Mongolian type includes,—
    (*a*) Eskimo.
    (*b*) Mongolian races of Asia.
    (*c*) Malay.
    (*d*) Brown Polynesians.
    (*e*) American Indians.
3. The Ethiopian or Negroid type includes,—
    (*a*) Africans or typical Negroes.
    (*b*) Hottentots or Bushmen.
    (*c*) Oceanic Negroes or Melanesians.
    (*d*) Negritos.

M. Topinard† describes the races at length in all their anatomical variations, according to the extensive system of anthropometry which is in vogue. Historically he says that the first attempt at classification was made by F. Bernier, in 1772. He divided mankind into four races, the White in Europe, the Yellow in Asia, the Black in Africa, and the Laplanders in the North. Then came Linnæus; his genus man included three species: *Homo sapiens*, *Homo ferus*, and *Homo mon-*

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*Anthropological Institute of Great Britain, 1884, in Smithsonian Report for 1855, p. 885.

† "Anthropology," p. 198.

strosus. The *sapiens* included the European and other intelligent races ; the *ferus* was the veritable wild man, dumb, covered with hair, and walking on all-fours ; and the *monstrosus*, the macrocephales and other monstrosities. The first classification to obtain prestige was that of Blumenbach, who described five varieties of the human race,—the Caucasian, the Mongolian, the Ethiopian, the American, and the Malay. This has been the source of all later classifications based on the color of the skin. M. de Quatrefages regards the whole race as a single stem with three trunks,—the White, the Yellow, and the Black,—which are divided into branches, these into boughs, and these again into families and groups. M. Louis Figuier* acknowledges five races (like many preceding writers), the White, the Black, Yellow, Brown, and Red, with the usual sub-divisions and varieties. As Dr. W. Lawrence says,† "The human skin is dyed with various tints of white, yellow, red, brown, and black, and exhibits in degree every intermediate shade possible, which gives names to five principal classes, *i.e.*, first, the White, to which redness of the cheeks is almost wholly confined ; second, the Yellow, in which a yellowish color of the skin prevails ; third, the Red ; fourth, the Brown ; and fifth, the Black." Following Blumenbach, Lawrence "regards the white or Caucasian as the primitive stock. It divides into two extremes, most remote and different from each other, namely, the Mongolian on the one side, and the Ethiopian on the other. The three other varieties hold the middle places between the two extremes. The American comes in after the Caucasian, then the Mongolian, then the Malay next to the Ethiopian ; but there is multifarious division and gradation of character on account of mixture of races."

Professor E. B. Tylor says,‡ "The classification of mankind into a number of permanent varieties of races rests on grounds which are not only obvious but definite. Thus the Negro, Chinese, or Australian certainly belong to three permanent varieties of man, plainly distinguishable from each other and from any European. Each race represents an ancient breed or stock, however these stocks may have arisen. The anthropological classification of mankind is thus zoological in its nature, like that of the varieties of any other group of animals. The color of the skin is especially distinctive. The colored race-portraits of ancient Egypt remain to prove the permanence of complexion during the lapse of a hundred generations. M. Broca has furnished a table for classifying the varieties of color, so that the minutest shade can be described. The color of the eyes and hair is also important, for in some races it is characteristic. Stature and proportion of limbs are less important. The conformation of the skull and its diameters, angles, capacity, etc., are very important, but can be used only in connection with other criteria of race. The general contour of the face is in part dependent on the form of the skull, and varies much in different races. It may be loosely described as lozenge-shaped, oval, pentagonal, etc. Some of the most marked contrasts to European types may be seen in the oblique Chinese eyes, the Kamschatkal cheeks, the pointed Arab chin, the snub Kirgis nose, the fleshy protuberant Negro lips, and the broad Calmuck ear. Taken together the features have a typical character, which popular observation seizes with some degree of correctness, as when we recognize a Jewish face in a European city."

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* "The Human Race," p. 19.

† "Natural History of Man," 1819, pp. 279, 550.

‡ Art. "Anthropology," in Encyc. Brit., vol. ii, p. 111.

Racial Facial Characteristics.

Lawrence gives as good a general outline of the facial characteristics and features of the different races as we can find. He says (*op. cit.*) the Caucasian variety have "a large cranium and small face; the upper and anterior regions of the skull are particularly developed, and the face falls perpendicularly under it. The face is oval and straight, with distinct features. The forehead is expanded, the nose narrow and rather aquiline, and the mouth small; the lips are generally turned out, especially the lower. The front of both jaws is perpendicular, and the chin is rounded and full. There are more strongly marked and various modifications in the Caucasian race than in any other, just as there is more variety in all qualities, mental and physical, in the higher races, the lower being more uniform and monotonous in all qualities, and these being therefore more indistinct. This is perhaps due to greater natural softness and delicacy or flexibility of organization, concurring with the influence of more ancient and complete civilization.

"The Mongolian variety is characterized by olive color of the skin; head of square form, with small and low forehead; face broad and flattened, with the features running together; the glabella flat and very broad; the nose flat and small; the cheeks rounded and projecting externally; the lineal aperture of the eyelids narrow; the eyes placed very obliquely; the chin projects but slightly, the ears are large, and the lips thick. The Calmucks (says Pallas) are characterized by obliquity of the eyes, which are depressed toward the nose, and by the rounded internal angle of the eyelids; by thin, black, and scarcely curved eyebrows; by the small and flat nose, which is particularly broad toward the forehead; by high cheek-bones, and a round head and face. The lips are large and thick, and the chin short. The Mantchu Tatars (says Mr. Barrow) are like the Chinese,—the small eyes, elliptical end next the nose, the high cheek-bones and pointed chin. Among the Thibetans the face narrows toward the chin. The Eskimo have high cheek-bones, broad foreheads, small eyes set far apart, the corners drawn together, and the mouth wide. The nose of the men is rather flat, but that of the women rather prominent.

"In the Ethiopian variety the skin and eyes are black; the skull is compressed laterally and elongated toward the front; the forehead low, narrow, and slanting; the cheek-bones are prominent, the jaws narrow and projecting, the teeth set obliquely; the chin receding; the eyes prominent; the nose broad, thick, and flat, and confused with the extended jaw; the mouth is wide and the lips thick. But as great a variety of features occurs among the Africans as can be met with in the natives of Europe. The sloping, contracted forehead, small eyes, depressed nose, thick lips, and projecting jaws are by no means constant traits. On the contrary, almost every gradation of countenance may be met with, from the disgusting pictures too often drawn of them to the finest set of European features. In some parts of Africa, intermixture with various other nations may have produced occasional departures from the original type of the race. In the north the aboriginal Berber tribes, then the Asiatic conquerers, the European colonists of all countries, the Abyssinians on the east, etc., have all mingled extensively with the Africans. The Kaffres have a distinct Arabian cast of face, the skin being brown, with a high forehead and prominent nose of European origin, but with thick lips and projecting cheek-bones. The Hottentots are more negroid, the cheek-bones wide, the nose very flat, and the forehead very narrow.

"The American variety has a dark skin of more or less red tint, and a countenance and skull very similar to those of the Mongolian tribes. The forehead is low, the eyes deep, the face broad, especially across the cheeks, which are prominent and rounded. The face is not flattened like that of the Mongols, and the nose and other features are distinct and projecting. The mouth is large and the lips rather thin. The forehead and vertex are in some cases deformed by art. Humboldt says the natives of South America and New Spain resemble the Mongol race by the form of the eye, the high cheek-bones, but differ from them in the form of the nose, which is long and prominent throughout its whole length and thick toward the nostrils, which open downward like the Caucasians. The forehead is quite narrow.

"The Malay variety has a brown color, the head rather narrow, the bones of the face large and prominent, nose full and broad toward the apex, and the mouth large. Under this variety are included races of men of very different organization and qualities, and yet too imperfectly known to classify directly. They inhabit the East Indian islands and Polynesia. The aboriginal inhabitants of these islands are like the African negroes, and are latterly classified as a negroid race. The Malays went from Sumatra and Malacca and drove them to the mountains. The Malays are a lighter race, with a more oval countenance."

(To be continued.)

ADENOID GROWTHS, MOUTH-BREATHING, AND THUMB-SUCKING IN THEIR RELATION TO DEFORMITIES OF THE JAWS AND IRREGULAR TEETH.

BY NORMAN W. KINGSLEY, D.D.S., NEW YORK, N. Y.

THE case described and illustrated in this article is that of a young lady, who was between twelve and thirteen years of age when she came under my professional care. She is the daughter of refined and cultured parents; her father a prominent physician.

Fig. 1 is an exact representation of her mouth, and face below the eyes at that time. The drawing is made from a plaster cast taken from life, but the upper part of the face has been varied purposely, to avoid the publication of a complete portrait.

This drawing shows the constant habit of the patient, with open mouth, because it was only with great effort that the lips could be brought in contact. The upper incisors are exposed and prominent; the lower incisors cannot be seen, being separated from the upper ones by a greater distance than the relaxed separation of the lips. This relation of the jaws to each other is more fully seen in Fig. 2, which represents the articulated models of the jaws.

The history of the case, as nearly as can be ascertained from the mother's recollection, is as follows: Through all the years of infancy the child was subject to asthma, and always breathed through the mouth, asleep and awake. She shed the deciduous upper incisors prematurely,—between five and six years of age, as nearly as can be remembered. Up to that period there was no malocclusion of the teeth.

The permanent upper incisors made their appearance also prematurely, before seven years of age, and from that time the upper and lower incisors began to separate, the discrepancy continuing to increase until remedial treatment was resorted to.

From seven to eight years of age, adenoid growths were discovered behind the palate in the upper pharynx. The reduction of these growths was first attempted with the electric cautery without marked success; but subsequently, at about eight years of age, they were completely removed by surgical operation. Since that time the breathing through the nostrils has been free and natural. Nevertheless, the space between the upper and lower incisors continued to widen.

FIG. 1.

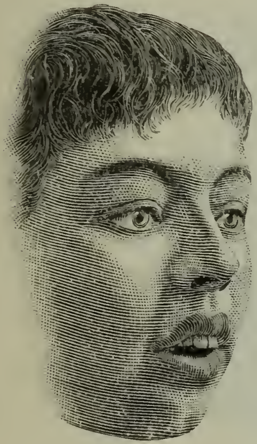
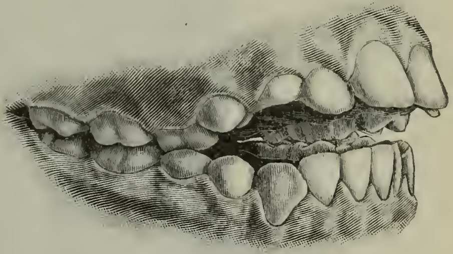


FIG. 2.



The impression made on my mind when I first saw the case was that the lower jaw alone was at fault.

I fancied that the lower jaw was bent down at the region of the bicuspids, and for the moment conceived the idea of bending it upward by mechanical means; but a study of the articulated models, as shown in Fig. 2 both separately and together, showed that the lower jaw was as perfect and well formed as any I ever saw. It was symmetrical in its arch, and regular in the plane of the occluding line.

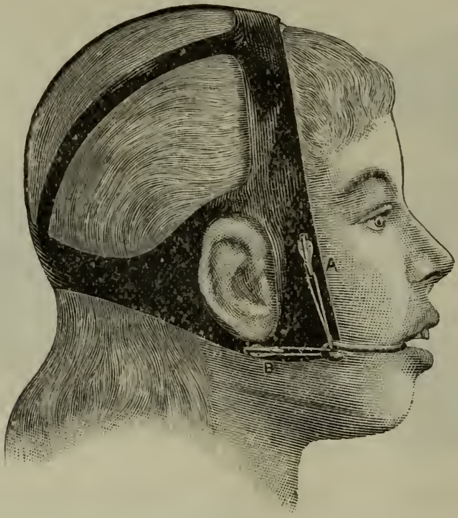
The opening of the jaws in front was due slightly to the projection of the incisors, but principally to an excessive and abnormal development of the alveolar process in the molar and bicuspid region, and the remedy must be in its reduction; or, in other words, the teeth and processes must be driven higher up.

The pitch and projection of the upper incisors would have been heretofore attributed to thumb-sucking or its equivalent, but that practice had never been acquired ; the child had never been a thumb-sucker. Still, we find a typical "thumb-sucking" case where there had been no thumb-sucking,—a perfectly developed and symmetrical lower jaw and a strangely abnormal upper one, coincident with adenoid growths of the pharynx and long-continued mouth-breathing.

It will be observed that the upper jaw in the region of the bicuspids is of normal width ; the lower jaw is also normal in width and outline, and the back teeth of the upper jaw occlude or articulate properly with the lower ones ; the opening of the mouth has not, therefore, caused a pressure of the muscles of the cheeks upon those teeth and narrowed the jaw.

As a proper correction of this deformity required the incisors to be carried backward somewhat, and as there appeared to be no spaces in the arch which would permit of its contraction, the first or sixth-year molar on each side was extracted.

Fig. 3.



These particular teeth were chosen for extraction in preference to the first bicuspids (which in many cases of protruding incisors would be proper), because they offered more resistance to correcting the malformation of that region than any other ; and *that*, together with the apparent necessity for extracting one tooth on each side to provide for retraction, seemed ample justification for the removal of two perfectly sound molars.* At the same time a deciduous molar which was hiding the second bicuspid on the right side was also removed.

The first attempt at correction was made with a skeleton skull-cap, as seen in Fig. 3, a padded cap over the chin (shown in Fig. 4), and a frame over the incisors, with arms projecting outside the cheeks, as shown in Fig. 5. The skull-cap was made of leather ; the chin-cap of sheet copper (stiffened around the edge with non-elastic steel wire accurately fitted to a plaster cast of the chin) padded, and covered with leather. When these appliances were in use, an elastic strap cut from rubber tubing passed from the hook near the angle of the chin-cap to the hook marked *a* on the skull-cap (Fig. 3), and another similar strap passed from the button at the end of the incisor frame to the hook marked *b* in Fig. 3. The expectations from such an arrangement are obvious. The strain upon the incisors would carry them directly backward, and the hope was entertained that the pressure of the lower jaw upon the upper at the points of contact would diminish the undue prominence.

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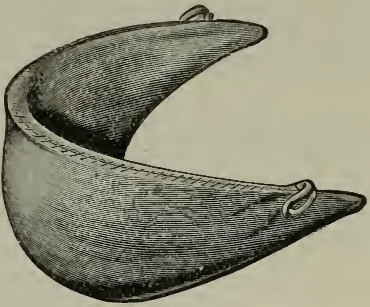
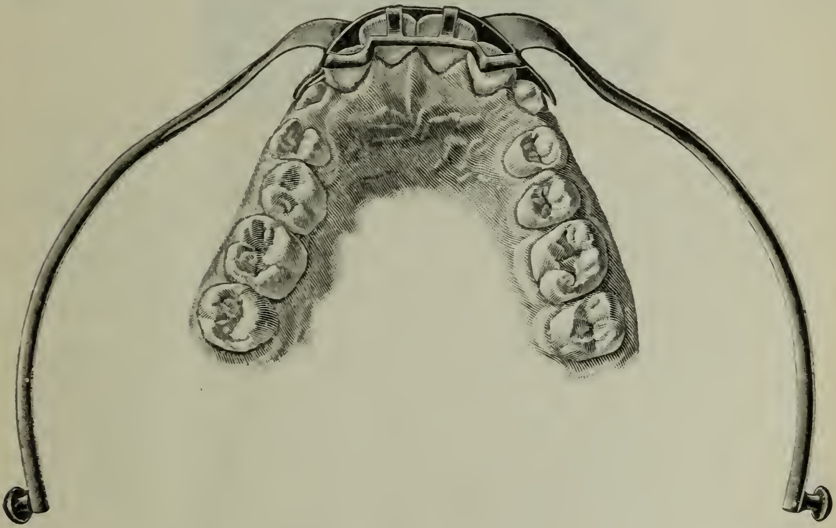
* I am convinced, by a study of the case since the correction was completed, that the extraction of those permanent teeth was unnecessary. I find now, to my surprise, that although there then appeared no room to carry the incisors back without extracting two teeth, there are now ample spaces among the teeth on each side to permit of another tooth.

Fig. 4.



It is worth while here to query whether pressure, being equal upon the lower as well as the upper molars, might not, if it had ever accomplished anything, have done so at the expense of one jaw as much as the other. However that might have been, the fact was that although worn continuously night and day, except at meals, for about three weeks, the chin became so sore under the pressure that we feared an abscess, and it was abandoned. It is doubtful if it served any purpose in closing the gap in front.

Fig. 5.

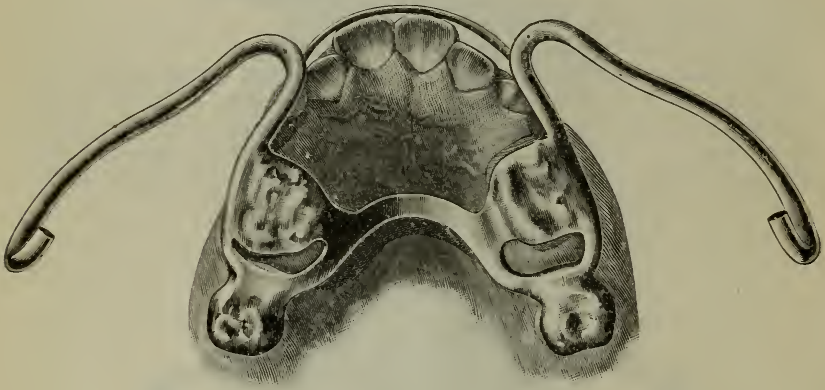


The frame upon the incisors did accomplish in that time all that was desired of it. The incisors, without being lengthened, were altered in their pitch and the cutting-edges moved back.

The reason that this apparatus did not lengthen the incisors in their backward movement was because the strain put upon the crowns was not at a right angle with a line lengthwise through the center of the tooth. The strain was at such an angle that the teeth were held in their sockets by a partially upward pressure while the absorption of the process behind them was going on. The distance backward which the cutting-edges were carried was ascertained to be eleven per cent.

This method of stating the change may need explanation. To say that the incisors were retreated so many "lines" or "millimeters" or "fractions of an inch" conveys an imperfect idea of the reality. The change of position is much or little, great or small, relatively; two millimeters might be very much in one case and very little in another, therefore a statement of percentages is more definite.

Fig. 6.



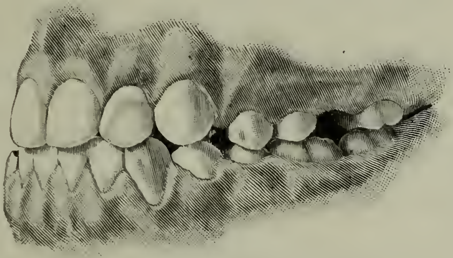
In this case the amount of the movement was determined by measuring on a perfect plaster model from the external face of the incisors at their cutting-edges directly back along the median line, until this line intersected at right angles a line across the jaw from the posterior surfaces of the last molars. Such a line on the cast prior to any movement represents one hundred per cent., and the same line after the movement in this case measured eleven per cent. shorter.

The second apparatus, which fully accomplished the work, I ought to have thought of in the beginning, as it is only an application of the principle involved in my interdental splints for the last twenty-five years. It is shown in Fig. 6: A frame covering the bicuspids and molars of the upper jaw, with arms coming out of the corners of the mouth and extending along the cheeks to a point exactly opposite the center of pressure required within the mouth; a small wire passed in front of the incisors to keep them from springing forward, and two elastic straps connected this frame with the skull-cap exactly as seen in Fig. 3. Both these elastics were required partly to prevent any tendency of the recently moved incisors from carrying the whole apparatus forward, but particularly to keep the proper balance of the skull-cap, the strain of either elastic alone having a tendency to pull it out of place.

The apparatus is made of one continuous piece of Stubbs' steel forged to follow the buccal faces of the teeth, then pass through the gap made by the extraction of the molars, and cross (without touching it) the vault of the palate to the other side. The bearings upon the teeth were made of silver plate swaged with accuracy to fit the *molars*, to keep the frame from slipping about, but resting only on the cusps of the bicuspids, thus giving freedom for lateral movement of the bicuspids.

It was essential that the extremities of these arms should be adjusted with great nicety, so that the force exerted through them upon the offending teeth should be evenly distributed. If the bearing were forward of the center, the apparatus would be loose at the back, and *vice versa*. This apparatus was applied about the first of March, 1891, and worn almost uninterruptedly without inconvenience until June following, at which time the upper and lower incisors were in contact, the upper ones lapping normally. (See Fig. 7.)

FIG. 7.



An embarrassing feature of this case now presented itself: the second bicuspid, which had developed in place of the extracted deciduous molar, had grown down to the point of occlusion with the lower teeth ; but it was pitched inward and articulated within the cusps of its antagonist, and the tendency was for it to be tipped still farther.

This was coincident with the removal of the family into the country for the summer, at such a distance that it was impracticable for the patient to visit me oftener than once a week.

Several futile attempts were made to force outwardly the malposed bicuspid without dispensing with the brace and skull-cap, until finally the apparatus had to be laid aside for a few days to admit of a jack-screw, and thus the bicuspid was driven into place. This jack-screw had its point resting in a pit upon a gold band around the malposed bicuspid, which band was cemented on with oxyphosphate : the opposite end of the jack-screw bore against a small plate, which covered two or three teeth and the gum of that vicinity, thus driving out one tooth without disturbing the teeth on the opposite side of the mouth ; but in doing so it opened the jaws again in front, and an entirely new apparatus similar to the other had to be made and adjusted.

This latter was worn constantly, with short interruptions, for a month, and the teeth assumed the position seen in Fig. 7. Since that time the appliance has been worn only at night, and the relations of the teeth remain unchanged. The contact of the incisors is now so close that a thread can be bitten off by them.

A study of the models Figs. 2 and 7 shows that the articulation of the molars at the present time is precisely the same as before regulation commenced, and the great change in the front of the mouth is attributable principally to the driving upward of teeth in the molar region, the upward and forward movement of the lower jaw, and partly by the incisors being carried back without elongating.

I do not in this article commit myself to, nor oppose, any of the theories of the relation of irregularities of the teeth to mouth-breathing, adenoid growths, or thumb-sucking, nor shall I here discuss the question of continuous or interrupted pressure.

(To be continued.)

METHODS OF FILLING TEETH.*

BY RODRIGUES OTTOLENGUI, M.D.S., NEW YORK, N. Y.

(Continued from page 1090, vol. xxxiii.)

RELATIVE VALUES OF AMALGAMS.

Amalgam is one of the most valuable filling-materials at our disposal. At the same time it is the most abused. It is more frequently chosen because of its cheapness than because of its special adaptation to a given case. The result is that it is not properly manipulated, and is too often allowed to remain without special polishing. Much of the disrepute that has become attached to amalgam is probably due to faulty filling methods, rather than to any bad quality inherent in the material itself.

One of the charges against amalgam is that it shrinks, thus producing imperfect borders, which invite decay. How much this may be due to using the material mixed of an improper consistency, is worth considering. I believe that the shrinkage of amalgam is reduced to a minimum by proper mixing. Another thing worthy of note seems to be the curious fact that this shrinkage does not appear to involve the entire mass, for if it did would not the filling become loosened within the cavity? This I have never seen. The discrepancy occurs at the surface, so that it would appear that all we need is a method of manipulation which will overcome this tendency to shrink along the border.

If it is necessary to use the dam for the insertion of gold, it is equally needful where amalgam has been decided upon. I do not mean that the dam must always be employed, for I have explained that it is not always a necessity even with gold, for which it is more often used than with other materials. It is more exact, then, to say that the cavity must be kept as dry as possible, whether by using the dam, or by dependence upon the napkin. I think that amalgam inserted without regard to moisture is more likely to become blackened than when caution is used to prevent the wetting of the material during its insertion.

In mixing the alloy with the mercury I prefer adding the mercury, a

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* Copyright, 1891, by Rodrigues Ottolengui.

little at a time, until a plastic mass is produced, rather than to use too great a quantity of mercury at the outset, and then depend upon expressing it. If mercury, squeezed from amalgam mixings, be preserved in a bottle, and then examined, it will be found that it contains a considerable proportion of metals which it has absorbed from the alloy. Thus it would seem that it has brought away with it a portion of that metal contained in the alloy for which it has the greatest affinity. The result must be an alteration in the proportion of metals contained in the alloy. Thus, if a given alloy is used for making an amalgam, and one mixing is made with just the proper quantity of mercury, while a second is prepared with an excess which is removed by pressure, it would seem natural to expect that the two would not act similarly even in the same mouth. This would explain, perhaps, the oft-claimed unreliability of an amalgam, where it will fail in a tooth upon one side of a mouth, and succeed admirably upon the other. It is not the amalgam that is unreliable, but the dentist, who has not a definite method.

As it would be a tedious process to weigh out the alloy and mercury for each mixing, we may resort to some less accurate way, provided that it accomplishes the result with reasonable reliability. If the attempt be made to mix alloys with mercury in the hand, it will usually result in an excess of the latter. We may better depend upon the pestle and mortar, preferably of small size. Place in the mortar the amount of alloy desired, and add a little mercury ; stir vigorously, and the mercury will take up all the alloy with which it can unite. Add more, and more, stirring between each addition, until the mass is soaked with mercury, but perhaps granular. If it now be turned into the palm of the hand and manipulated vigorously, the friction produced will aid in the amalgamation, and a mass quite plastic can be produced. This plasticity is not the result of an excess of mercury, for we have seen that while cold, in the mortar, it did not reach such a consistency ; it has been attained by heat rather, and there is no need to squeeze out any mercury, though, in order to be sure that there is no excess, it is as well to squeeze with the finger and thumb. That amount of pressure will not force out any mercury if too much has not been used, and if this method of mixing be followed it will rarely occur that any excess will be found.

The amalgam is now ready for use. To place within a cavity as large a mass as can be crowded in, would be as incorrect as to follow the same rule when using gold. Choose a piece which can be dropped into the cavity easily, and which under pressure will become packed *without fracturing*. The homogeneity is thus preserved. With a bit of bibulous paper rolled into a small ball and held in the foil-carriers, the amalgam is next pressed, and smeared into all the crooks and corners of the cavity. Usually this first portion of amalgam may be treated so that it will form a veneer covering all the walls. This insures adaptation. Piece after piece is to be placed in this way, and if the mass was properly mixed no excess will come to the surface, while under the action of the ball of paper a hard filling is produced at once. In large cavities a burnisher may be used over the paper, to exert more force than can be attained with the foil-carriers.

When the cavity is filled, the next step is to follow the process which I say will prevent shrinkage. Indeed, it will do more, *for it will* *preserve a handsome "white" color for years.* Alloys which contain a large proportion of gold have not proven successful. Nevertheless it is gold upon which we must depend for this most desirable improvement in amalgam fillings. Take gold foil No. 3 (No. 4 may be used, but the thinner grade is preferable), and tear it into small pieces without folding or rolling. When the tooth has been filled with the amalgam, place upon it a piece of this thin foil. Then with a *warm*, *smooth burnisher* gently stroke the gold till the mercury in the amalgam absorbs it. This is not the old scheme of using tin to extract mercury from an amalgam filling. In that method the tin does not enter the filling, but acts in removing the mercury, as a sponge does in sopping up water from the floor. *The gold*, *on the contrary*, *must be forced into the filling*, *so that it changes the surface into an amalgam of which gold is a component part.* Gold is to be manipulated in this way, upon and into the amalgam, until it will no longer be absorbed. This can be continued until the surface of the filling is quite hard, and even golden in color. This color will not be retained after the crystallization, but the filling when polished at a subsequent sitting will be found of fine texture, and will receive a mirror-like finish.

Where a large contour is to be made, involving say two or three cusps of a molar, an excess of amalgam is to be used, and then when the gold is applied a density will soon be reached which will allow the operator to carve up cusps, by removing the excess of material and forming sulci, after which more gold is to be burnished into the filling until the surface is apparently set. A large filling of this character may be dismissed with little fear of seeing it crushed into shapelessness at a subsequent visit. Moreover, it is much easier to trim up a contour while the material is thus semi-plastic than to be obliged to defer this for another day. It thus becomes apparent that if the best results of amalgam are to be reached by burnishing gold into its surface, we cannot hope for the most perfect fillings when we use a matrix, and do not obtain a separation of the teeth in advance of the filling. This is only one more argument against the matrix, which I have said is useful only with amalgam, whereas now we see that even with this material it has its disadvantages, since it prevents the burnishing of gold along the approximal surface.

There is another method of manipulating amalgam to which I will allude, since it is little known, though I do not care to take the responsibility of recommending it, for the reason that though I have used it with seeming success, I have not done so for a length of time sufficient to make me ready to indorse it.

When filling with amalgam, we often have an excess of the material which we throw away as useless. If, instead of this, these surplus pieces are preserved, they may be used thus : where a large filling is to be placed, with the usual danger of fracture, during mastication, before perfect crystallization has occurred, this may be prevented by using the bits of amalgam left over from previous mixings. These of course have crystallized. Take one in the carriers, and hold it in the alcohol flame until softened by heat. Quickly place it upon the filling, and with a *hot* burnisher force it into the mass, which will immediately become hardened. With a little practice this may be done very satisfactorily. Whether it will prove durable or not, I am not prepared to state absolutely. It is to be remembered that it is *superficial* shrinkage which we are desirous of preventing, and may this not accomplish it, *since we use for the surface a bit of amalgam which has already crystallized out of the mouth?* Besides, this is very similar to the advocated method of using copper amalgam, except that the latter becomes plastic under the application of heat, and retains this consistency for a considerable time, whereas the ordinary amalgam returns to a crystallized form almost immediately, so that rapidity of manipulation as well as skill is requisite.

Before passing from this subject of the rapid hardening of amalgams, I must note a fact which I have never seen published. Often, after mixing a large mass, a longer time becomes requisite for packing the filling into the cavity than had been anticipated. Thus a portion of the material, not yet used, begins to set, so that it is difficult to manipulate. I have resorted to a heated burnisher to restore its plasticity, with the invariable result that while I have succeeded in incorporating the amalgam with the filling, the surface has been immediately hardened. Thus I think it safe to assert that heat, while packing amalgams, hastens their setting.

I now approach the important subject of *where* to use amalgams. I am not a believer in the material to such an extent that I would advocate the too common practice of deciding that any cavity which is in an inconspicuous location may be as well filled with amalgam as with gold. Too many patients have been so educated by contact with dentists, that they will say, "It will not be seen, doctor; therefore fill it with amalgam." This is an error, though the converse is true,—*i.e.*, "It *will* be seen; therefore *do not* fill it with amalgam," though even to this last rule there must be an occasional exception, as far back as the bicuspid region. I think it would be a wise rule which would rigidly exclude amalgam from incisors and cuspids, while the bicuspids should be included as often as possible.

Cavities in the crowns of molars, though out of sight, should be filled with gold, the rule being relaxed only as the cavity becomes larger. If a cavity be small, and therefore of that class which may be safely filled with anything and be preserved as long as the duration of the material, *it is the very place for gold*, because gold is the most durable and reliable of all materials. A phosphate or a gutta-percha filling will stop caries, but these must be considered temporary, and amalgam preferred to either. For a similar reason gold must be chosen instead of amalgam. As we come to consider cavities of larger size the rule becomes less binding, till at last the point is reached where it becomes a decidedly difficult question to determine which material must have preference. One way of reaching a decision is to consider that the seemingly frail walls will still support a gold filling, because of the fact that the pulp is still living. In a similar cavity, where the pulp has been removed, it might be safer to depend upon amalgam. After this point has been passed, and the cavities presented for consideration are of great size, amalgam should be the first choice, and gold used only where everything combines to make a perfect operation possible. Thus, if the patient is of good health, with strong nervous stamina, and willing to endure fatigue, it becomes possible to place a large gold filling, with the hope that the last third may be as well condensed as the first. Too often operator and patient undertake that which, because of the tediousness, becomes so great a tax, that in the end the work is hastily finished, and thus improperly completed. Either the gold is not packed with sufficient force to produce a resistant density of surface, or there is not sufficient material used to allow of proper contour or occlusion. Again, given favorable circumstances as to health and strength of patient, the welfare of the tooth itself must be considered ; that is, whether the placing of a gold filling would become a hazardous operation. Where a recent attack of pericementitis has been aborted, it might be attended with unfortunate results to work upon the tooth for a period long enough to fill it with gold.

Thus, as I have said, as the cavity increases in size, the demand for amalgam is correlatively increased, though a gold filling properly made is always preferable.

An important place for amalgam is where the cavity-border is below the gum-line. No filling will succeed here unless the finished surface along the gingival border can be made scrupulously smooth. There are many such cavities which should be filled with amalgam rather than with gold, solely for the reason that the amalgam may be made smooth more readily than gold. Many such may be filled with gold by a dentist dexterous in placing the dam, and yet the filling after completion may defy the efforts of even a skillful operator to properly polish along the gingival border. Approximal trimmers will do much, but at best they leave a filed surface. Would we deliver a gold plate which showed file-marks? If not, why should we leave a filling in such a condition? It must be remembered that the cavity-border up under the gum-line may be accessible while the cavity is empty, but the placing of a properly contoured filling must make it more than ever inaccessible, so that the gingival border may become utterly concealed. An amalgam filling may be made flush at this important point while it is yet plastic, and the utmost care should be used to make it so at the time of filling, for if a gold filling is difficult to polish, an amalgam filling, after hardening, is even more so.

It is claimed by some that it is good practice to build with amalgam from one approximal cavity across into another in the adjacent tooth. This seems to be of doubtful merit, and rather to be condemned than advocated. However that may be, it is generally admitted that a filling in an approximal cavity must not jut out and press upon the gum-tissue. Moreover, care must be taken not to force particles of amalgam under the gum, which by being left may bring about a condition of ulceration. Where the dam cannot be placed, I have found a means of accomplishing this very nicely. Take a bit of bibulous paper and make a tight rope of it, thick enough to just pass between the teeth. This rope is to be laid against the gum and pressed up beyond the cavity-margin, which can be done more often than would seem possible to those who have not tried it. This effectually prevents any material from passing beyond the gum-line, and when drawn out after the tooth is filled leaves a well-defined space, wherein the burnishers may be used for properly shaping the filling along the gingival margin. Nevertheless, in spite of the efficacy of this, it is usually advisable to thoroughly syringe the parts with warm water, using a syringe which will throw a stream with considerable force, placing the point at the gum-line, so that the water passes between the teeth and washes out any dêbris.

In spite of the fact that I have here advised the use of amalgam in cases where the gingival margin is above the gum-line, yet I would distinctly deprecate the use of this material for patching gold fillings which have failed in that locality. I think it would be better to remove the leaky filling entirely before refilling, for certainly I have seen numerous successful cases where the amalgam had been placed along the gingival border first, and a completion of the filling made with gold subsequently. Let me not be misunderstood, therefore. It is not the use of amalgam in connection with gold that I deprecate, but only its use as a *patch* near the gum-margin. This brings us to the consideration of amalgam in combination with other materials. It has been successfully used with gold in two ways. The most widely known is where the amalgam is placed along that part of a cavity which, being below the gum-line, is impossible to keep dry. This is filled with amalgam until the dam can be placed so that the rest of the cavity may be dried thoroughly. The amalgam is allowed to set, and at a subsequent sitting a portion of it removed, leaving as little within the cavity as possible, without risking the slipping of the dam. The gold is then placed, being partly anchored into undercuts made in the amalgam. This is often advisable. Especial cases arise where a large portion of an anterior approximal surface of a bicuspid has been lost by caries. Restoration with amalgam alone would be unsightly, and with gold alone impossible. The amalgam may be placed along the gingival fourth or fifth of the cavity, and covered with gutta-percha, till the next sitting, when it will be found that the dam may be used and the gold packed into the remainder of the cavity. When all is done, nothing shows but the gold.

The second method is to pack the gold upon the fresh amalgam. To accomplish this a matrix is required, and the plastic golds are preferable to form the contact with the amalgam. This kind of gold may be readily packed against the amalgam, and will soon assert itself by overcoming the efforts at amalgamation to such an extent that the filling may be completed with cohesive foil at the same sitting. A filling of this nature made in a glass tube an inch long, one-half of each metal, has been so successfully made that the resulting rod when removed from the glass showed a perfect union, with great strength, between the gold and the amalgam. The objection to this, in my mind, is that the matrix must be used.

It will frequently occur that a cavity is so shallow and of such poor shape for retention that it is questionable whether an amalgam filling would be retained. Here we may frequently depend upon a method which is exceedingly useful with gold also. Mix oxyphosphate to a sticky consistency, and smear some upon the walls of the cavity, immediately adding some amalgam. Allow the phosphate to set thoroughly, and the amalgam is practically cemented to place. The filling is then continued by adding more amalgam, and will be more likely to remain in place because of the underlying phosphate. Care must be taken, before adding the second batch, that no phosphate be left overlapping any of the margins, as that would leave a weak point.

In a similar way, in deep crown cavities, we may depend upon the phosphate, not only as a protection to the nearly approached pulp but as an additional retentive precaution, provided we pack the amalgam before the phosphate sets, instead of waiting till afterward, as is the usual custom.

The mixing of an amalgam with a phosphate I have never tried, and can see no advantage in. The mixing of the alloy with the phosphate, however, is totally different, and in many cases a practice deserving of much praise. The dry phosphate powder is mixed with the fine filings of an alloy, and afterward used in connection with the liquid, exactly as plain oxyphosphate fillings are made. The presence of the metal interferes with the mixing only a little, and the usual putty-like consistency may be attained. A filling of this kind is to be placed and allowed to set two or three days. It may then be polished by using a smooth stone in the engine.

I have seen these fillings advocated in all positions, but I consider them more useful in masticating surfaces than elsewhere. The disadvantage of any cement filling is that it slowly dissolves out. By adding the alloy we have an ordinary phosphate filling which holds a number of particles of metal in close contiguity. As with any other phosphate, the material itself gradually wears away. As the metal does not dissolve, it is plain that the surface becomes roughened, as the metal filings become more and more exposed. For this reason it is not wise to use the method in approximal surfaces, since the roughened filling will invite decay. But in the masticating surface a totally different result obtains. As fast as the metal filings are exposed, they are flattened down by attrition, till at length the whole surface is metallic, and can be burnished just as an amalgam filling may be. After this, the phosphate being thoroughly protected by this metallic veneer, there is no further waste.

These fillings are especially good in temporary teeth, though I sometimes use them in adult mouths. When I do, it is because of their low conductive power. Where a cavity is very sensitive, and it is deemed advisable to place a filling temporarily until such time as when, the sensitiveness having been controlled, gold may be inserted, this combination of an alloy mixed with a phosphate is excellent.

Copper amalgam has been so much in vogue during the last few years that I can scarcely pass this subject without alluding to it. I have only a few facts to mention, and will leave deductions to the reader.

When copper amalgam was introduced into this country as a substitute for the ordinary alloys, its advocates claimed that aside from not having many disadvantages attributable to ordinary amalgams, it possessed a *therapeutic* quality, in that no carious action could recur in its vicinity. *Practice has not substantiated this claim. Copper amalgam fillings, from the hands of practitioners known to me clinically as expert operators, have come under my observation leaking badly.*

When a copper amalgam filling becomes thoroughly blackened, is then well polished, and finally assumes a bright ebony-like surface, it seems to be the most admirable tooth-saver known. This is a success. When, on the contrary, it does not become black, but remains a dull, lusterless gray, it will be found readily removable with an excavator, and will waste away as surely as a phosphate filling. This is a failure.

Were it possible to determine in what mouths, and under what conditions, these two results could be prognosticated, we would be enabled to give copper amalgam a prominent place in our cabinets. But when it is known what many have observed, first, that fillings which appear successful for months will suddenly deteriorate into a condition similar to that described as a failure ; second, that fillings may be successful, and unsuccessful, in the same mouth at the same time; and third, that two fillings have been made at the same sitting, from the same material, placed in the same tooth, both in the masticating surface, and that one of these has proven successful while the other has utterly failed, we are compelled to admit that at present copper amalgam is utterly unreliable. It has been suggested that the failures are attributable to the manner of manufacturing the material. This may be so. But until the true secret of manufacture shall have been discovered, copper amalgam cannot be recommended.

(To be continued.)

ARTIFICIAL TOOTH-CROWNS UPON THE NATURAL ROOTS.

WITH A DESCRIPTION OF A PROCESS AND INSTRUMENTS TO PREPARE ROOTS TO RECEIVE A PREVIOUSLY PREPARED CROWN OR METALLIC COVERING.

BY RUFUS G. STANBROUGH, D.D.S, NEW YORK, N. Y.

(Read before the First District Dental Society of the State of New York, November 10, 1891.)

FOR a period of over thirty years the operation of inserting artificial tooth-crowns, as described by Professor Harris in his work, "The Dental Art," published in Baltimore, 1839, with a few variations regarding the kind of pivot to be used, was the only method employed; and so unsatisfactory had this operation become that the editor (Austin) of the tenth edition almost discourages it. He (Austin) lays great stress upon these two points: (1) The difficulty of preventing the presence of secretions between the crown and root; (2) the more or less rapid enlargement of the canal requiring frequent replacement, and the ultimate loss of the root.

In the experience of the dental profession of the last twenty years, we can heartily indorse Professor Harris when he says,—

"Under certain circumstances this method of inserting artificial teeth is the best that can be employed."

What are these circumstances or conditions, as we understand the artificial tooth-crown?

1. A suitable subject,—one in whom there exists no pathological diathesis or cachexia.
2. A healthy root.
3. An accurate adaptation of crown and root.
4. A strong and durable means of securing crown to root.
5. Correct alignment in the dental arch.
6. Correct antagonism with teeth of the opposite jaw.
7. Natural appearance.
8. An artificial tooth-crown which can be readily and easily conformed to all these conditions, and which can be readily repaired in case of accident.
9. Reasonable ease and rapidity of performing the operation.

Let us look for one moment at what has been done since the publication of the tenth edition of Harris, to restore the artificial tooth-crown, which had sunk so low at that time, to the high opinion of it held by Professor Harris and the very high opinion we have of it.

1. We have a far better understanding of the anatomical, physiological, and pathological conditions of the teeth and associate parts.

2. We have advanced very much in our knowledge of the medicinal and surgical treatment for the restoration of these parts to health when in a diseased condition.

3. We know that if we would have success, the mechanical treatment of root and crown must be such that to all intents and purposes when all are united they and the means of attaching one to the other must be as one solid whole, with no opportunity for the secretions of the mouth, or that which is taken into the mouth, to find lodgment and undermine that which we have joined together.

In this direction our minds have been bent, and let us briefly see what has been done.

Professor Harris recognized the vulnerable point, and lays great stress upon it when he says, "The base of the crown should touch every part of the extremity of the root." And, gentlemen, this is just what we have been working for the past twenty years—to make every part of the crown touch the extremity of the root, and provide a means to prevent decay of the exposed end of the root. How have we accomplished it? I will not enter into the history of this great desideratum, but will briefly call to your minds what has been done in this direction. This has been accomplished in part or wholly by one of the following methods:

1. The exposed end of the root has been concaved, grooves or retaining-pits cut in the root, and the exposed end of the root filled with either gold, amalgam, or a cement.

2. By metallic coverings, either swaged from casts of the exposed end of the root or fitted by burnishing directly to the root.

3. Layers of gold or tin foil have been interposed between the crown and the root.

4. Various amalgams and cements have been applied to the root and the crown immediately upon placing the crown in permanent position, cementing both together, forming one solid structure.

5. A porcelain tooth, provided with a backing and pin or pivot of metal, has been built in the root with gold; the gold serving for a filling and securing the porcelain face with its backing and pin to the root.

6. The root banded, or half-banded, a metallic covering fitted to the exposed end of the root, a porcelain face backed with metal and soldered to the band and plate, all provided with a pin and cemented in position.

7. Various forms of tooth-crowns have been invented, either provided with a pin burned solidly in the crown or separate. The crowns are either convex at their base or hollowed out; the crowns and pins to be fitted as well as may be to the root, and crown, pin, and root all cemented together.

8. The pulp-canal of the root has been drilled or reamed out, screw-threaded, and a screw-post screwed into the root. A porcelain face is provided with metallic pins, which are bent around the post to hold the face in position upon the root. The porcelain face is also provided with a recess to receive a plastic material which is applied to the end of the root and into the recess of the face, when the screw-post and face are in position on the root; this material serving to protect the root from decay and to retain the porcelain face in position.

9. Vulcanized rubber, by various means, has been adapted to the root extremity and to the base of the crown, serving to make a close adaptation of crown and root.

10. The root has been extracted, the crown and root fitted and fastened together, and the root replanted in the alveolar process.

11. Several forms of root-facers, provided with a guide, have been used, using the pulp-canal for a center, converting the exposed end into a dowel whose shape is determined by the sectional shape of the facer; metallic caps being provided which fit the dowel as formed upon the root, to which porcelain faces and pins are attached, and when these parts are united are cemented upon and into the root.

12. The root has been counterbored to receive a metallic plate or disk and pin which shall accurately fit the counterbore, and the porcelain facing united to these metallic parts and cemented in place.

The means of securing crown to root have been as varied as the methods of adaptation. From the wood pivot of fifty years ago, with its variations, to the latest forms of metallic pivots or posts, all the changes have been rung. The pulp-canal has been reamed out, screw-threaded, and a threaded tube screwed into the root; the bore of the tube being either round, square, or many-sided, to receive a correspondingly shaped metallic pin or pivot which exactly fits it. The tube has been secured in the root by wedging in with gold or tin, forming a filling for the root to protect it from decay and to secure the tube. All forms of amalgam and cements have acted their parts to secure the tube in the root. The internal surface of the tube has been screw-threaded, provided with a screw, forming the direct bond between crown and root; in fact, every conceivable way that a tube could be used for this purpose has been tried. We have used pivots of wood, wood and metal, and metal alone. These metal pins are of almost all conceivable shapes; some round, some square and grooved, and either smooth or barbed. We have screw-threaded the roots and used screws of all kinds, nickel, copper, platinum, gold, platinum and gold, and platinum and iridium. It would seem that human ingenuity had been exhausted to produce a strong, solid, and durable artificial tooth-crown. All these systems have their uses, and we cannot do justice to our patients and ourselves unless we are familiar with them all. They all have in view these cardinal points: a close adaptation of crown and root, a strong means of uniting the crown to the root, and to provide a means of hermetically sealing the root, or interposing a material between crown and root to render the joint absolutely impervious to the entrance of the secretions of the mouth or extraneous matter of any kind.

These methods are all open to one or all of the following objections: the length of time consumed to perform the operation; the difficulty of most of them; dependence upon the cement or interposed material for strength; irritation to the tissues of the gum, bone, or periosteum.

Considering the labor of members of our profession upon this subject, and what has been the difficulty, can we reasonably expect to overcome that difficulty?

Professor Harris recognized the difficulty. He says, "The base of the crown should touch every part of the extremity of the root, so that it may rest steadily and firmly upon it. . . . The practice of closely fitting it, anteriorly to the root and leaving posteriorly a large space between the two, as is often done, should be carefully avoided, for any aperture between the crown and root affords a lodgment for extraneous matter, and the tooth itself is more readily loosened than it would otherwise be.''

Here is the problem,—to make the base of the crown touch every part of the extremity of the root. If it were possible to do this,—that is, to make *absolute* or water-tight contact between crown and root, and provide a means to hold the crown and root in contact,—the difficulty would be overcome : we would have a perfect tooth-crown. We will not admit that this is impossible, but there is a limit to human endurance, and could we afford the time to accomplish this, our subject would not submit. We have been obliged to resort to expedients which render the point of contact between crown and root practically water-tight. All our efforts have been directed toward making the joint more perfect and to simplify the operation. These expedients are of three kinds :

1. The interposition of a metallic plate between the crown and root.
2. The interposition of a fluid or semi-fluid cement between the two.
3. Mechanically shaping the root by means of cutting-instruments which shall give such form to the root that a previously prepared metallic cap or disk shall exactly fit the root so shaped.

Theoretically, the first and third of these expedients would require no cement to make the joint water-tight, but in practice it is found that a cement or a material to fill the interstices must be employed.

After our experience in this operation, which of these expedients is most likely to overcome the difficulty?

I think you will agree with me that a practical, mechanical means of shaping the root to receive a previously prepared metallic covering or tooth-crown would be by far the best. You are familiar with what has been done in this direction. I believe nothing practical has yet been accomplished, and I will not waste your time pointing out defects in any mechanical method that has been proposed. The question is : Is it possible, conditions being favorable for the operation of crowning, to so prepare the extremity of the root, when in place in the alveolar process, that the base of the crown shall touch every part of the extremity of the root and rest steadily and firmly upon it?

We have advanced so much since the time of Professor Harris in knowledge of the teeth and associate parts, that a root being presented for crowning, we are able to form a nearly correct judgment of the advisability of this operation.

Of the preparatory medicinal and surgical treatment of roots I shall have nothing to say, but confine myself to a description of a mechanical process, and instruments necessary to this process, for the preparation of the root to receive a previously prepared artificial tooth-crown, and to a description of the crown and the means of attaching it to the root. To better illustrate my process and mechanical devices, reference is made to drawings of a typical case, and of the devices employed, and to the figures and letters of reference marked thereon, in which like parts are designated by like figures or letters of reference.

Figures 1, 2, 3, 4, 5, and 6 are cross-sections of a root at or near the gum line, showing the exposed extremity of the root and the various steps of the operation of preparing it to receive the burring device shown in Figs. 7, 10, and 11. Fig. 1 shows the exposed pulp-canal after the remains of the natural crown have been removed. After this has been done, with a twist-drill the pulp-canal is reamed out as shown (Fig. 2, *B*) to as great depth as may be deemed necessary for the subsequent stages of the process, but not to a depth that will cause irritation at the apex of the root, shown at Fig. 2, *A*, *B*. The guide of the bur (Fig. 11) is now introduced into the drill-hole *B*, and the bur being caused to revolve, cuts a concave cavity in the exposed end of the root, forming a seat for the drill-guide (Fig. 8), and removing root-substance to allow the portion of the projecting pin or guide of the special burring device represented at *N*, Fig. 7, to enter the root when the special burring device is being used.

FIG. 1.

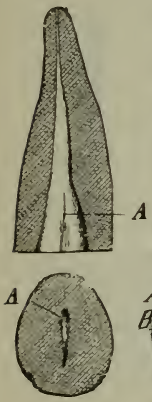


FIG. 2.

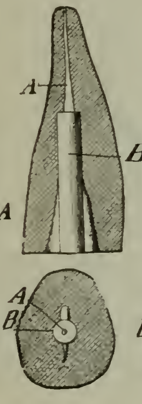


FIG. 3.

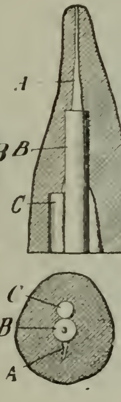


FIG. 4.

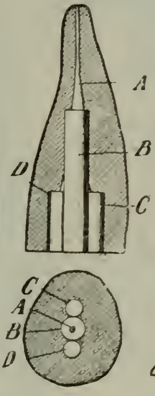


FIG. 5

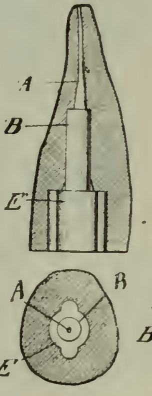
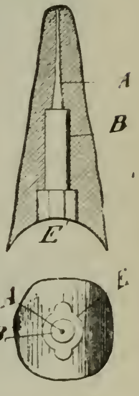


FIG. 6.



The drill-guide (Fig. 8) is provided with a projecting stem *F*, a body *G*, drilled with two small holes *H*, *H*, in line and parallel with the axis of the stem *F* and with each other. The stem is of the same diameter as the drill-hole *B*, Fig. 2, and is now introduced in the drill-hole *B* in the root, care being taken that the holes are in antero-posterior relation with the labio-palatal diameter of the root.

A twist-drill of the same diameter as the drill-holes in the guide (Fig. 8) is now passed through the anterior hole of the guide, and being revolved, drills a second hole in the root parallel with the pulp-canal, that has been reamed out, but only to a slight depth, as represented at *C*, Fig. 3. The drill is removed, a pin passed through the hole in the guide and into the second hole in the root, this pin serving to keep the guide steady while a third hole (*B*, Fig. 4) is drilled in the root through the posterior hole in the drill-guide. Upon removing the drill, pin, and guide, we now have exposed in the free end of the root three holes, one large and two small, as represented in Fig. 4, parallel and in line with each other, as represented in section in the figure. The portion or root-substance between the circumference of the hole *B*, Fig. 4, and the diameter of the holes *C*, *D*, Fig. 4, is now removed by a rose drill, Fig. 9, which is provided with a guide, *F*, and cutting-surface, *I*, which cutting-surface is *only* at right angles to the guide, *F*. This rose drill is allowed to remove the root-substance only to the depth that the small holes *C*, *D*, Fig. 4, have been drilled in the root. The appearance of the cavity formed in the root by these several operations is that shown in Fig. 6, *E*.

Fig. 7.

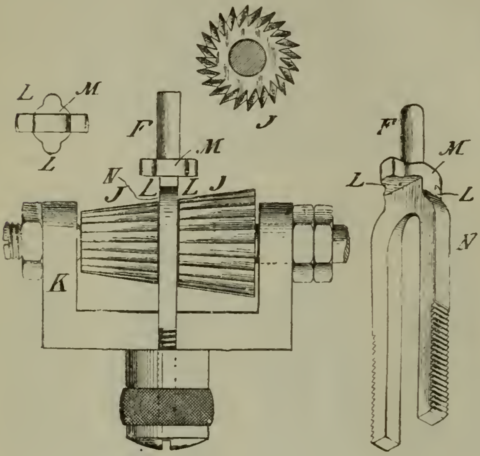


Fig. 8.

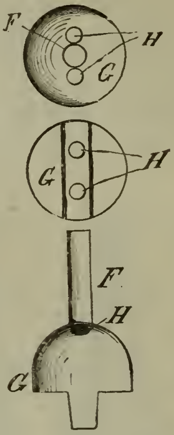
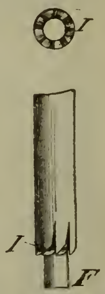


Fig. 9.



To so shape the exposed surface of the root that it shall have a concave surface, which is the arc of a circle whose diameter and whose angle to the cavity formed in the root have been predetermined, I use the bur and guide shown in Fig. 7. This bur consists of the cutters *J*, *J*, revolving in a frame *K*. This frame carries a protecting pin, *F*, which fits accurately in the hole *B*, Fig. 4, as does also the template *L*, *M*, *L*, of the exact sectional shape of the hole *E*, Fig. 5. The pin *F* is inserted in the hole *B*, and the template *L*, *M*, *L*, in the hole *E*, and the revolving cutters pressed against the free end of the root. The pin *F* acts as a guide for the revolving cutters, preventing them from cutting except as determined by the angle formed by the pin *F* and their cutting-edges. The template *L*, *M*, *L*, accurately fitting the

Fig. 10.

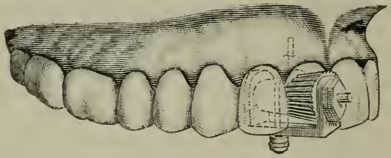
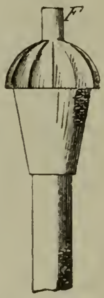


Fig. 11.



cavity *E*, prevents the cutters rotating upon the axis of the pin *F*. The cutters are caused to revolve until they so shape the exposed extremity of the root that it shall have a true concave surface, as shown at Fig. 6.

The remaining cylindrical portion of the hole *B* in the root is now screw-threaded with a suitable tap. The root is now ready for the reception of a screw-post, artificial tooth-crown, or metallic plate or cap for attachment of a crown or bridge.

The artificial tooth-crown consists of the body (*O*, Figs. 12, 13), of porcelain, having for its base or surface of contact with the root when in position on the root a convex surface which is equal to that of the concave groove formed in the root by the cutters *J*, *J*, Fig. 7. This surface has passing through it into the body of the tooth-crown, but not through the latter, a metallic tube, preferably of platinum, whose exposed circumference is equal to the circumference of the counterbore, Fig. 9, and fits tightly the cavity *E*, Fig. 5, made in the root by the counterbore, Fig. 9. The internal surface of this tube fits tightly the screw-post *F*, Fig. 13. This tube is to be burned into the body of the porcelain tooth-crown in such a manner that it shall be firmly attached, after the convex surface of the artificial tooth-crown has been so shaped as to conform to the concavity formed in the root by the cutters *J*, *J*, of the burring device, Fig. 7. The free end of the tube has a length equal to that of the depth of the cavity *E*, Fig. 5, formed in the root by the counterbore, Fig. 9 ; and is intended, first, to occupy the space made by the counterbore ; second, to aid in selection of the crown for the case under operation by holding the crown in position, that judgment may be made of its adaptability to the case ; third, to form a dowel from crown to root for the permanent connection of crown and root ; fourth, to receive the retaining-post *F*, which, acting as a dowel from root to crown, connects the two firmly when all are in position.

FIG. 12.

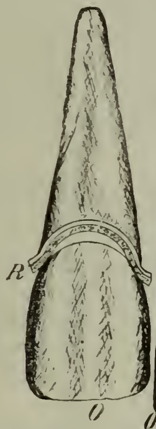


FIG. 13.

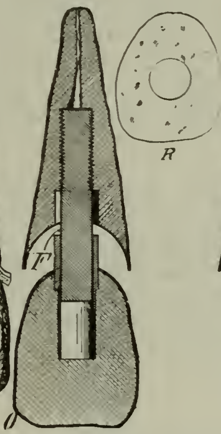
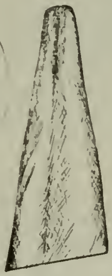


FIG. 14.



To so shape the periphery of the crown at the convex base that it shall have the same shape as the circumference of the root, use an elastic disk (*R*, Fig. 12), which is provided with a hole of the same external diameter of the tube, and a thin, pliable, metallic template of the same size and shape as the elastic disk, also provided with a hole. The metallic tube or crown is passed through the hole of the elastic disk and of the metallic template. The tube is then inserted in the cavity (*E*, Fig. 5) of the root; a light tap being given to the cutting-edge of the crown causes an impression of the periphery of the root to be made upon the metallic template, which serves as a guide to so shape the circumference of the convex base of the crown that it will exactly coincide with the circumference of the root, and thus prevent the crown causing irritation to the tissue of gum, bone, or periosteum.

To secure both crown and root thoroughly together, the root and cavity *B*, Figs. 2, 3, 4, 5, are thoroughly dried; the screw-post *F*, Fig. 13, is coated with any semi-fluid cement, and firmly screwed in the cavity *B*, which has been previously screw-threaded for its reception. The free end of the screw-post *F* is left long enough to occupy nearly or entirely the internal length of the tube in the crown.

I now cover the cavity *E*, the concave surface of the root, and the free end of the post with cement, and before this is hardened or set I force the tooth-crown to its permanent position. The cement is not intended to be any element of strength, but simply to fill any space that may be between the tooth-crown, screw-post, and root.

This process, instruments, and crown are applicable to the incisors and cuspids of both maxillæ, and to the bicuspids which have a reasonably straight root, or one in which the bifurcation is straight, or nearly so.

The cutters *J*, *J*, Fig. 7, may be varied in size, shape, and taper, and the crowns be supplied to conform to the cutters, so that this process may be applicable to a great variety of cases.

I submit the process, instruments, and crown for your consideration and criticism, hoping that I have pointed out to you one solution of the difficulty, How to make the base of the crown touch every part of the extremity of the root so that it may rest steadily and firmly upon it.

A SAFETY-PIN FOR ARTIFICIAL TOOTH-CROWNS.

BY DR. M. RYNEAR, NEW YORK, N. Y.

(Read before the First District Dental Society of the State of New York, November 10, 1891.)

In attaching porcelain crowns to the roots of teeth, it has been the custom to enlarge the pulp-canal so that the cavity thus formed is perceptibly larger than the pin employed, which pin is usually constructed from a solid piece of metal, either round, square, tubular, or tapered.

The evident inability under such conditions to obtain a firm bearing for the pin during the time necessary for the cement to harden has, no doubt, been the immediate cause of many failures, for the reason that the slightest movement at this time tends to destroy the adhesion of the cement and to affect the expression of the crown by altering the angle of hold.

The safety-pin seeks to remedy these and other defects. Fig. 1 shows the safety-pin, which consists of a flattened piece of metal with a longitudinal slot in the upper portion and a smaller circular hole or slot near the base.

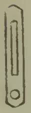
Fig. 2 is a staple or saddle, also made of metal, which can be used to strengthen the pin at its neck by being placed through the longitudinal hole in the pin, as shown in Fig. 3.

Fig. 4 is a platinum tube which can be passed through the hole in the base of the pin, and in combination with the saddle, Fig. 5, can be baked into the body of the tooth, Fig. 6.

Fig. 7 is a new porcelain tooth, which is a combination of the pivot tooth and the Genese crown, being made after the pattern of the pivot tooth, with a piece of platinum baked into it at its base.

Fig. 8 is a twist-drill of definite size, the diameter of which corresponds exactly with that of the safety-pin.

Fig. 9 is a file with definite curve, which corresponds exactly with the curve at the base of the porcelain tooth.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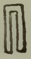
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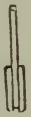
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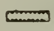
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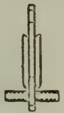
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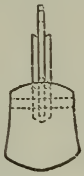
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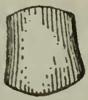
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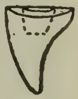
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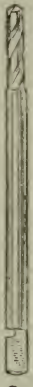
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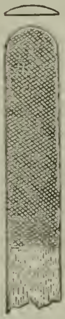
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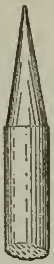

10.

Fig. 10 is a tool by means of which the pin can be shaped as sh in Fig. 11.

Fig. 12 shows root of a tooth which has been concaved at its neck by means of the file, Fig. 9, to correspond exactly with the convex root border of the tooth-crown Fig. 7.

Fig. 13 is a sectional view of the same root, with a hole made by the twist-drill, Fig. 8, which hole corresponds in diameter with that of the safety-pin.

Fig. 14 shows side view of a porcelain tooth with pin attached and applied to the root.

Fig. 15 shows a front view of the same tooth.

Fig. 16 shows a front sectional view of a root with crown attached, having platinum pin, saddle, and tube baked into the porcelain as shown in Fig. 6.

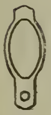
Fig. 17 shows a sectional view of a root with the pulp-canal enlarged.

Fig. 18 is a sectional view of the same root with porcelain tooth attached, having the safety-pin spread as shown in Fig. 11.

Fig. 19 is a porcelain tooth with safety-pin attached, the pin being divided at its upper end, thus forming two pins, each having a pronged point, the pins bifurcating from a common base.

Fig. 20 is a sectional view of a bicuspid root with porcelain tooth attached, having divided pin as shown in Fig. 19.

Before referring to the advantages claimed for the safety-pin, I will take occasion to state that at the clinic given by the First District Dental Society last month I exhibited this pin and crown, and demonstrated the method of attaching them by means of a solder specially prepared for the purpose, using only a spirit-lamp, and without first investing the tooth. I feel confident that the gentlemen now present who were there at the time will sustain me in stating it was a simple and quick operation, and also an effective one.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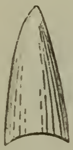
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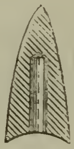
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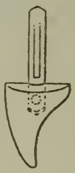
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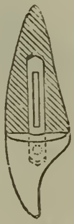
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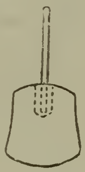
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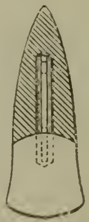
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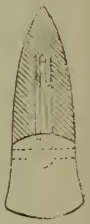
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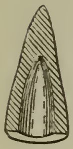
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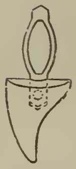
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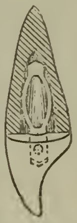
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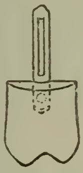
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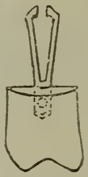
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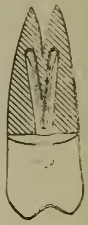
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The advantages claimed for the safety-pin are:

It is capable of being perfectly adapted to any of the front teeth.

It affords bearings within the root by means of which the crown is retained in its proper position during the time the cement is hardening.

It can be firmly attached to the root by means of the solid hold afforded by the cement passing through the longitudinal slot, or when the upper end of the pin is divided by means of the prongs at the ends of the two pins thus formed.

The hole in the base of the pin allows of a platinum tube or pin being passed through the same, as before explained, Fig. 5, to which the teeth can be attached to the approximal surfaces of the crown

The longitudinal slot in the upper portion of the pin permits of the saddle being passed through it (also explained in Fig. 5), thereby greatly strengthening the pin at its neck and preventing it being bent at this point after it has been cemented to the root.

In combination with the porcelain crown (Fig. 7), the pin and the crown can be fitted separately to the root, thus securing a perfect adaptation of all the parts.

In applying a crown according to the method here suggested, it will be found that it can be done without pain to the patient, and that it requires but a little time and trouble on the part of the operator to accomplish an effective and durable piece of work.

THE DIDACTIC METHOD IN DENTAL TEACHING.

BY C. M. WRIGHT, D.D.S., CINCINNATI, OHIO,

PROF. PHYSIOLOGY AND GENERAL PATHOLOGY, OHIO COLLEGE OF DENTAL SURGERY.

A CURSORY study of a great number of medical and dental periodicals for several years past develops the fact that medical, like the dental journals, have certain subjects which are continually coming to the surface in unexpected places. "Medical Education" and "Dental Education" are foremost among these pet subjects which are most frequently exploited.

Well-known writers, casual writers, editors, students, and others seem impelled by some impulse to write upon the subject of education at one time or another. In the large majority of these essays no greater harm is done than by writers on the equally important subject of "Success in Life." It is quite possible that the same pens have pranced musically over the pages at one time to the tune of "Success," and to the tune of "Education" at another.

There may, however, be harm in the number of blows struck in ceaseless hammering away on anything, however intrinsically valuable it may be. Gold foil may be attenuated beyond its usefulness by too long-continued hammering. Drops of water constantly falling upon one spot will wear away the firmest substance, or shatter the most unflinching nerves. Essays upon education from any, every, and all sources, drop, drop, dropping in never-ending monotony upon the minds of teachers, make the didacticians tired, and in their weariness they may be induced to accept the doctrines of the persistent word-makers on the subjects. In the hope of freeing themselves from a nuisance they may exclaim, "It is true! We accept (anything)! We agree! Now give us a rest!"

The particular doctrine which has been shot at the teachers in medical and dental schools from the pop-guns of epistolarians of all sorts for some years past, and which perhaps has worried them the most, is the one which affirms that "the lecture system is a failure." We may, indeed, now admit that this is a popular notion of the day. New colleges denounce the old method and boldly cry, "No lectures! All subjects taught by recitations! Hurrah!"

People read these flashing words, rub their hands, and say, "It is well; the lecture system must go."

Writers on education feel the tingling and jingling of the red blood-corpuscles in their peripheral capillaries, and smilingly admit that "that is the doctrine. *We* had to sit hour after hour and listen to old Professor A and young Professor B. Did we learn anything? No. A thousand times No! Do we know anything now? Read the answer in—our essays on education!"

I do not wish to cast ridicule upon the *subject*. I do not mind, however, expressing myself forcibly against mere writers,—writers who have not even learned the art of making their productions interesting. But when a practical man, a *teacher*, rises to explain, I take off my hat with respect and listen attentively.

For years the methods in vogue and still generally employed in the dental as well as medical schools in teaching anatomy, physiology, chemistry, pathology, etc., were by lectures, illustrations, diagrams, and experiments; the lectures supplemented by the so-called "quizzes," where a subject is pursued by questions on the part of the professor or quiz-master, and answers on the part of the student. In other words, by set oral examinations or recitations, consisting of questions and answers in reference to the various subjects embraced by the lectures. One or several good text-books are recommended, but the note-book has been the only recognized authority for the student. Thus much in explanation of the older method of instruction. Will anyone deny that for trained students this is an excellent method of teaching almost any branch of science? There are, however, certain faults associated with this method in classes made up of mixed elements. In fact, all classes must be made up of mixed elements. There are certain psychological and physiological reasons for this, which no one will dispute when he considers the various intellectual and physical capacities (varying in quality as well as in degree) which every class of men, even the smallest, must present.

Perhaps the most prominent mental faculty definitely localized in the cerebrum of the student, which the teacher in a professional or technical school must furnish and stimulate, is that which is known as memory. Just what impression goes to these gray cells in the brain of the student, just what condition the impression maintains in the centers, so that pictures, or sounds, or motile acts may be reproduced from the stored-up negative at future times, either automatically, from association, or at will, we do not know, but we have reason to believe that perception is first in the order of mental and nervous operations,—perception of impressions received through special-sense organs of various kinds,—sight, hearing, touch, etc. The object of the text-book and of the lecturer on any science or art is to awaken the perception,—to make vivid impressions upon the perceptive faculties,—so that these impressions may affect the memory-cells. They can then be of use in the future. There is, as I have said, a difference in the susceptibility to impressions in the perceptive faculties of different minds. This difference may be illustrated in inorganic substances by reference to the impressions of light. A sensitive plate used by a photographer, and a sheet of white paper, are both sensitive to light, and both can be made to impart images. The difference is in degree. This difference seems to exist to a marked degree in gray nervous matter, of which different individuals possess different qualities. In one we find a sensitive visual memory, in which pictures of objects that have been seen, as the printed page, the drawing, the figure, the thing represented by words, is *visible* to the mind, and can from it be reproduced. Another person has the auditive memory, and sounds, explanations by the voice of another, words heard in the lecture-room, form the clearest impressions stored away for future use in the memory's domain. It will not be necessary to go farther into this subject and refer to the so-called motile and concept memories. We can easily believe that if ten students sit down to a study of a chapter in a text-book, it may be safe to say that there will be ten impressions,—no two alike, either in character or intensity of shading. Some do not take impressions immediately or ever very distinctly from printed words. To be sure, with the chapter before them, repeated impressions can be made until the memory has been sufficiently impressed to assure the retention of the images. This is not true of the lecture unless the student is an expert note-taker, when by repetition he can secure the same advantage. Again, if these ten students sit down with their note-books and listen to a lecturer, who has learned by experience how to present his subject well, ten impressions will have been made, and we may expect a like difference in the distinctness, the shading, and the prominence of this or that portion that we found after the study of the text-book.

What can a teacher learn from these facts, if they are facts?

Can he become a partisan? Can he join the "Down-with-the-Lecture" party? Please observe that there has been no dispute in regard to the value of *recitation* on the part of the student. Strictly speaking, there can be a combined *lecture and recitative* method, such as we have had for years, or a *text-book and recitative* method.

For a year past, in teaching physiology, I have confined myself to the text-book and recitative method exclusively. I wanted to test for myself the method that seems destined to become fashionable in law, medical, and dental schools. I think I can say from my own experience that this method is a good one as far as it goes, but that it does not entirely meet the requirements of mixed classes, or the varying degrees of susceptibility to impressions necessarily present in all classes. Possibly it has no advantages over the lecture system, exclusively followed. From one year's experiment with the "no-lecture" plan, added to past experience of the old method (which, by the way, was the ladder by which we have all climbed to our present state of knowledge in medical, legal, scientific, and dental science, and which certain modern teachers and writers propose to ruthlessly kick aside), I am decidedly in favor of a combination of the good points in each method. I should recommend to the class a particular text-book on the subject to be taught, and should assign regular lessons. The students would be expected to come prepared to answer questions or to recite from the author on the lesson assigned. At another meeting, or at regular intervals during a session, the teacher should deliver lectures on the same topics, reviewing, explaining, illustrating the subjects, so that they would become illuminated. The interest of all of the students would be increased. The advantages of repetition would be gained. The student who has the auditive memory more keenly set to receive impressions, as well as the student with the more sensitive visual memory, would be benefited by the stimuli to his different organs of perception. The habit of taking notes would be acquired, and in final reviews or in competitive examinations the note-book as well as the text-book would become an authoritative source of knowledge. All of these advantages to the student, it seems to me, would naturally follow the employment of the combination of lecture and text-book method as portrayed.

We have, I think, physiological, psychological, and practical reasons for the adoption of the plan proposed.

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PROCEEDINGS OF DENTAL SOCIETIES.

FIRST DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

The First District Dental Society of the State of New York held a regular monthly meeting Tuesday evening, November 10, 1891, in the New York Academy of Medicine, No. 17 West Forty-third street. The president, Dr. Norman W. Kingsley, in the chair.

Dr. F. A. Roy, chairman of the Clinic Committee, read the following

Clinic Report.

The regular monthly clinic was held this afternoon at the rooms of The S. S. White Dental Manufacturing Company, Nos. 1 and 3 Union Square. Seventy-three dentists were present. . . . The Kells electric system was shown in its different forms by John M. Drennan, for The S. S. White Dental Manufacturing Company. All the forms are capable of giving a slow speed with positive power, a great desideratum, allowing the bur to cut surely and clear itself. No bur should be used at so high a speed that the blades become clogged. Higher speeds can be obtained in the same apparatus. The full system consists of engine, mallet, and mouth-lamp on one resistance by which the speed of the engine and amount of current for lamp and mallet are controlled. There is a safety-plug so placed that no possible accident can occur; any current that might lead to accident simply and always burning out the plug. And the full current *used* is only perceptible to contact with moistened fingers. Each part of the apparatus is connected on safety principles. The engine is controlled by a pedal, switch-heel contact starting, and toe-pressure stopping, instantaneously. This has proved in practice the only satisfactory switch, convenient to handle, and causes no strain on the foot as does an ordinary push-button. The same system is applied to different engines and in different combinations of the several parts. With the cord engine the lowest speed is obtained. The electric mouth illuminator was also shown. Attached to the head-rest of the chair, a five-candle lamp in a hooded casing on a hinged bracket-arm throws a strong light on any part of the mouth without affecting the eyes of patient or operator. A large lamp used for resistance will illuminate the whole office. . . . Dr. A. S. Richmond showed his apparatus by means of which he applies warm air for drying cavities, getting a perfect dryness with its obtundent effect, or with oil of cinnamon as the doctor's favorite application for obtunding and for treating cases of pyorrhea. Any other agent can be used. The instrument has a syringe point and a solid copper bulb which is heated one-half minute or more. A continuous flow of air is obtained by a double rubber bulb arrangement or by a foot-blower. A chamber is provided for holding medicine, and a valve in the handle gives perfect control of the stream of air. The result of a few treatments was shown in the mouth of Mr. Harmstad. There was evidently a great improvement. The doctor claims he also bleaches teeth with the hot-air current, and that gold almost sticks to the walls of a cavity dried in this way. . . . Bryan, Enholm & Co. exhibited an entirely new form of primary battery. They claim the minimum of internal resistance, as seems to be proven by the way it stood continuous hard work without any drop in speed or power. They also claim that it is the most economical battery, due to the fact that the strong acid is inclosed in an impervious cup and therefore the zinc is not attacked by it. There is no porous cup. Estimated cost of running, not more than five cents an hour for continuous work. It seems to be a battery very easily taken care of, there being no climbing salts, no fumes, and no sediment; the only care necessary is simple changing of fluids. A case of four cells was exhibited to-day; but two cells seemed to do all necessary engine work and four cells were ample for lathe work. The C. & C. motor with engine-arm, Bonwill electric mallet, the mouth-lamp, and a polishing-lathe were operated. This battery is the only one that has satisfactorily run the phonograph motor, which requires steady continuous power. One cell has operated over one hundred hours absolutely continuously. . . . Mr. Edward S. Butler, a student at the New York College of Dentistry, was induced to show an engine made entirely by himself, showing great ingenuity. With a sewing-machine wheel to start with, he made a wooden base and treadle, made the upright and arms of brass tubing, and turned out the pulleys and hand-piece of brass, and the inner parts of the hand-piece of steel—similar to a No. 4 hand-piece. It is a very creditable and handsome piece of workmanship. . . . Dr. Rynear showed new soldering pliers to be used with his porcelain crown-work. . . . I had found a material suitable for a plaster spatula after some search, and thought it might be appreciated by a few who used plaster, and I think *nearly* every dentist must use plaster. I had only about fifty. They were made of spring bronze, which does not rust and is easily cleaned.

Incidents of Office Practice.

Dr. E. P. Hoyt. Some twenty-five years ago, a patient came to me with a lower wisdom-tooth that was very badly decayed and the pulp just exposed. Having prepared the cavity, I was somewhat at a loss how to treat it. It occurred to me to place in the bottom of the cavity over the pulp-exposure a pad of white silk and rather soft amalgam over it, gradually filling up the cavity. Some six months ago the case came back to me. The tooth had become very loose, and was no longer of any use, so I extracted it and split it open, and found the silk, although slightly discolored, to be in very good condition, and the vitality of the pulp had been preserved.

Dr. Rufus G. Stanbrough then read a paper entitled "Artificial Tooth-Crowns upon the Natural Roots."*

Dr. M. Rynear then read a paper entitled "A Safety-Pin for Artificial Tooth-Crowns."†

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* See page 29, current number.

† See page 36, current number.

Discussion.

Dr. L. Ashley Faught, of Philadelphia. The subject before us is of great practical importance. I can, however, only confine my remarks to it, as I have no experience in the use of either of the methods embodied in the two papers read this evening.

The keynote of success has been rung by the first essayist, when he says that success in the adaptation of artificial crowns to natural roots is only to be attained by having the crown touch the root at all points. As I have not been so fortunate as the essayists to have a method of my own to present to you, I shall be able only to state in few words what seems to my mind and in my experience the most successful method of procedure. For the bicuspids and molars we have nothing that can equal the gold cap-crowns, which in their adaptation encircle the roots. For the six oral teeth we need to not only consider strength but also esthetic conditions, and here the greater number of cases will be best served by constructing crowns of English plate teeth, properly backed, and shaped by flowing solder upon it and around the pin to be inserted into the root, this pin being made to pass through a basal piece of gold plate previously adapted to the face of the root, and joined to a small band or collar perfectly fitted around the neck of the root. I submit herewith a set of instruments designed by Dr. M. L. Long, of Philadelphia, for shaping the face of the root and for cutting its neck to receive the band or collar. The facers differ only from those of Dr. Ottolengui in being made safe-sided, thus preventing accidental marring of the adjoining teeth. I would also in this connection call your attention to a method lately presented to the profession by Dr. W. H. Gates, of Philadelphia. [Here Dr. Faught explained it by drawing upon the blackboard.]

Dr. F. T. Van Woert, of Brooklyn. Copies of the papers presented were sent me in ample time to prepare to take part in the discussion, which I have done, not by the wayside or since entering this room. I have read them carefully, and come prepared to discuss them. I am a poor impromptu speaker, and have therefore written what I have to say.

The discussion of papers, as a rule, is rather an unpleasant task for those taking part in the same. The respect and good-fellowship for those reading the papers, and the sense of duty to the profession and the person discussing, are almost sure to clash. One dislikes to antagonize friends in public ; yet it is this very antagonism or adverse criticism which brings out the true virtue of the subject presented.

Respecting the system presented by Dr. Stanbrough, it is certainly very ingenious, and to my mind a very practical method of securing an absolute union between the natural root and an artificial crown. The adaptation, mechanically, is nearly perfect ; besides the evident ease with which a crown, when broken, may be repaired, without interfering with the anchorage in the root. This, I think, is one of the strongest points in its favor.

To many I presume it would seem a little complicated, and this may be the means of preventing the use of the system ; yet mechanically, it is as plain as that twice two are four. Whether this will have anything to do with its universal adoption in the profession, is something that time alone can determine. There is only one serious objection that I can see to the system, and that is the concave formation at the end of the root; but Dr. Stanbrough has informed me that this can be remedied by changing the shape of the cutters, thus preserving more tooth-structure; so it will be unnecessary for me to dwell on this point of objection. I can only say that I am utterly opposed to the least sacrifice of any portion of the natural root unnecessarily, or for no possible gain. This point I will make clearer to you in the discussion of Dr. Rynear's paper, which I will now take up.

In beginning, Dr. Rynear says it has been the custom to enlarge the pulp-canal so that the pin or dowel of a crown would not come in contact with the sides or walls of the root. I regret that he did not insert "years ago it was the custom," rather than "it has been the custom," for it is a well-known fact that the majority of practitioners of this day make every effort to secure as close-fitting a dowel or pin in the root as it is possible to do without danger of fracturing the same.

There would be no difficulty in deciding which of the two roots were stronger, that of Fig. 1 or Fig. 3.

FIG. 1. FIG. 2.

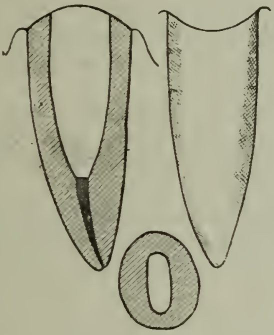
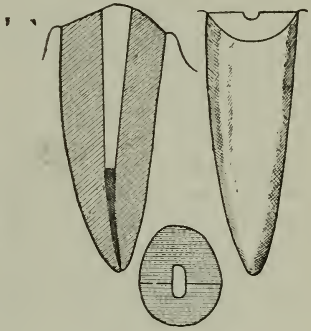


FIG. 3. FIG. 4.



Should a case present itself where caries had removed so large a portion of the root, we can do a great deal toward preserving or making the remainder useful; but I hardly think there is one among you who would place the confidence in this case that you would in a case where the root was preserved to the extent of one represented in Fig. 3. It seems a little inconsistent, to say the least, to cut away that which nature has supplied for the sake of making up the same artificially.

I think Dr. Rynear has made a mistake in naming his pin. I should call it anything but a safety-pin.

We come again to the question of concaving a root in preparing it for a crown. This method involves a great sacrifice of good tooth-structure; while if the tooth is prepared convex, you have, as a result, a great difference in the amount of material preserved.

As you well know, this is a great hobby of mine, and I think I have practical scientific theories to support me in it.

In Fig. 1 you have a cross-section of a root prepared in a manner similar to that suggested by Dr. Rynear.

Fig. 2 is a view of the same from the anterior portion, showing the concavity of the end. Dr. Rynear takes almost the opposite view to that of Dr. Stanbrough. His evident desire is to get as little bearing of the pin upon the root as possible, and yet hold the tooth in position to permit of its being set with cement. I can but feel that this is a great mistake.

I believe the true dowel or pin for holding a crown is the one that has a bearing on the root over its whole surface ; and it is a long time since I have used any of the pins manufactured, for the simple reason that it was impossible for me to get a sufficient bearing with them ; and to overcome this difficulty I prepare a root for the reception of a pin, as shown in Fig. 3. After this I take a piece of soft pine, whittle it to fit as near as possible to the cavity, and by tapping it lightly with the mallet I can make it conform to almost the exact shape. I then remove the stick and wrap around it platinum foil, replace it in the root, and drive it lightly to place with an ordinary gold plugging-mallet. Then I remove it, and slide the platinum from the stick ; place it on my soldering block, and fill it in with some good rigid metal, such as clasp metal, or 18-carat gold, taking the precaution to coat the outer surface with whiting to prevent the metal from flowing over it. This gives me a pin that fits the cavity as nearly, I think, as it is possible to make one. It requires very little cement in the setting, and makes a very rigid and serviceable crown anchorage ; and with the root prepared convex you will find it almost an utter impossibility to fracture the same.

Dr. Rynear says, in closing, that by his method a crown can be placed in the mouth of a patient without pain. The same might be said of any system of crowning whereby the pericemental membranes or gum margin are not encroached upon.

In referring to my method of crowning, I did it with no idea of impressing you with any claim to priority in the matter, but rather to sustain the points of objection that I have taken to the systems presented by the gentlemen this evening.

I shall be pleased to give a description of my method of crowning in response to the wish of the society, but I beg the gentlemen present to not misconstrue what I say, as I have been placed in a rather embarrassing position on several occasions by one or two members of this society who seem to have delighted in pointing out the fact that Van Woert's crown did not belong to him ; notwithstanding that Van Woert has never laid claim to priority in a crown, but simply to the method of constructing it. Had these gentlemen of whom I speak been conversant with the dental literature of the day, they would not have made some of the absurd statements they have.

About three years ago I had great difficulty in repairing several bridge-pieces, and some crowns as well, which so exercised me that I set about finding some method of relieving myself from such difficulties should they present themselves in the future ; and one of my first steps in this direction was to look up all the old and new methods of constructing crown- and bridge-work. During my investigations I came across different things which led me to revise, so to speak, a very old system, one that was patented on May 13, 1851, again on December 15, 1859, June 26, 1883, June 9, 1885, and August 16, 1886. This last patent, No. 347,544, was issued to J. L. Williams, and is now owned by The S. S. White Dental Manufacturing Company. Part of the others mentioned are English patents, and their method of construction varies slightly ; but all are of the same principle. I cite these cases simply to show how old the system is. In August, 1890, I wrote an article for the *Dental Mirror*, in which I gave fuller details.

I became satisfied that this system of dovetailing porcelain faces to metal backs was the true one ; and it only needed to be revised so that ordinary plate teeth might be used, and an accurate dovetailed backing produced without too much complication, feeling the necessity for something to relieve the distress caused by the absolute removal of the whole piece when the case needed repair. Besides, in this I could see a way to avoid heating the porcelain faces, which process, I am sure, in the most of cases, weakens them materially.

Therefore, to make the system more practical in the hands of the profession at large, if it were ever to be adopted by them, I devised an instrument for which I do claim priority, as I have never seen anything like it ; and if any gentleman present can show me where or when such was devised, other than as I have stated, I will graciously concede the honor, if there be any, where honor is due. After selecting a straight-pin plate-tooth, a piece of dovetail wire, drawn to gauge, is to be punched and riveted to it, countersinking the punched holes to half the depth of the gib wire ; the diameter of the countersunk hole to be fully one-third larger than that of the pin, so that, after riveting, the proportion of the rivet is such that it will make the attachment as strong as when soldered. This gib wire is the same size and shape as the template on the pliers designed for bending the backing.

To adjust the backing to the tooth a strip of metal, either gold or platinum, should be caught between the gib template and one jaw of the pliers, and held in that position by pressure upon the thumb-piece attached to the gib template, as shown here.

Now, by bending the gold over the gib template and throwing it down to free it from the opposite jaw of the pliers, the pliers can be closed, and the result is a metal backing which will fit accurately over the gib riveted to the tooth.

The gib template can be detached from the pliers, so that the pliers can be used to adjust the backing upon the tooth itself, in case of any derangement in handling. This backing should be placed upon the tooth and trimmed to shape, and with it in position the tooth ground and adjusted to whatever foundation the operator may choose to apply for his bridge or crown-piece ; wax it securely in position, remove the whole piece from the mouth, and slide the porcelain face from the backing, after which the surface of the backing that comes in contact with the tooth and gib should be thoroughly coated with whiting, and care taken in investing that the gib recess is perfectly filled with the investment material. This will prevent the ingress of solder, which would make it difficult to replace the facing after the case was removed from the investment.

Another feature which I consider quite valuable is the time saved by not having to wait for your case to cool off. Just as soon as the soldering is completed, it can be thrown into a little acid, when the investment will leave the case, and it will be clean and ready for the completion of the operation.

Now slip the facing into place, and grind the piece to a proper shape to correspond as nearly as possible with the contour of the adjoining teeth, after which remove the facing, wash the different parts thoroughly, then with a penknife barb the edge of the gib on the tooth, and after setting the piece in the mouth, whether it be crown or bridge-piece, force the facing into place with a foot-plugging instrument and hand-mallet. It takes very little pressure, yet makes it very secure.

I might state here that I, as a rule, put a little very thin oxyphosphate between the backing and tooth; not to add strength to the attachment, but simply to prevent secretions from making the piece offensive. This it is impossible to do with teeth that are soldered to a fixed backing, and yet there is no better adaptation between tooth and backing than there is by this method, so that the case can certainly be kept very much cleaner than it has been possible to do before.

Now, in case of accident, all that is necessary is to take a broken excavator, and with very little force you can push the gib from its socket, cut the heads off the pins, push them through from the back, leaving the gib as perfect as when originally made; simply adjust it to a new tooth, re-rivet, and insert as before.

It is always well to have a duplicate set of facings, to avoid delay in securing new ones. The expense is a mere trifle, and it is a great advantage to be able to repair a case with so little difficulty and consuming so little time, which would not exceed ten minutes.

Dr. E. Parmly Brown. Dr. Stanbrough says it will take twenty thousand dollars to make his crown and put it on the market so that the profession can use it. If it will do as he says, it is a very beautiful piece of mechanism, and any man who is a dentist ought to admire it. I do not see, however, how he can be sure that with his pin there will be no change in position, that it will not point in too much or out too much.

We have next Dr. Faught, from Philadelphia. I must say I dislike to hear a gentleman in this age, and especially before this society, recommend gold crowns on the upper bicuspids! Dr. Faught's idea of crowns for the bicuspids, especially the superior bicuspids, is certainly not the height of art; it is the sum total of barbaric show, and there is no other language that will express it. The strength that Dr. Faught claims for a cap crown can be obtained in another way. If he will put in the superior bicuspids two pins, and have a platinum band encircle the root, the attachment of the porcelain crown can be made very strong. It will do better than the other way. They can be backed in porcelain, and it will be as strong an operation and a work of art besides.

If my central tooth were gone, and the root remained, and I had nothing better, I should put in any gold or gold-back crown sooner than putting in a plate. Whether Dr. Stanbrough's system will do in anchoring a bridge or not, I do not know.

Speaking of bridges and crowns, I think I can safely say that while not one-quarter of the members of the First District Dental Society to-day are furnishing bridges for their patients, there are bright men all over this land, from the Atlantic to the Pacific, from New Orleans to Canada, who are doing it. The other day, in speaking to a member of this society, he said, "Yes, I am making bridges now; I am making money at it, too. The people will have them." The people know what advanced dentistry is, if that statement be correct. He said they came to his office and asked for bridges; and they came again; and he either had to make the bridges or lose the business.

As porcelain bridge-work has been somewhat adversely criticised, supposing I were to tell you that in eight years' use of porcelain bridge-work, during which time I have put in a thousand cases, I have had but twenty-five failures, would there not still be nine hundred and seventy-five magnificent successes? At your anniversary meeting two years ago I presented a lady who had four pieces of porcelain bridge-work in her mouth, which had been in constant use for a sufficient length of time to prove either a success or failure, but not one crown had come off. What if Tom, Dick, or Harry has some accidents with this work before he is expert, or because he will not take the trouble to become proficient? This certainly does not militate against the successful results of those who have persevered until they have attained proficiency. The men who succeed are those who, like Columbus when he came to America, are not afraid of a shipwreck nor an occasional failure.

Dr. Stanbrough. I merely wish to explain what Dr. Brown referred to about the twenty thousand dollars. It would cost that to introduce the crown universally; I do not think it would take that amount of money to get up a few molds or instruments and get the gentlemen to try them, and that we will endeavor to do. To make this system meet all cases so that the crowns when mounted will conform to the dental arch, they must be manufactured in great variety.

In working up this crown, I made perhaps two hundred sections of incisors, cuspids, and bicuspids, and almost invariably the center line or axis of the tooth was found to intersect the apex of the root, center of the pulp-canal, at the cervical portion, and the cutting-edge of the crown. Now, as the convex base of the artificial crown is ground to shape, using the hole in the crown as the guide, it is simply a question of having the hole in the crown in the center of the convex surface of the base, and in line with the cutting-edge, to grind the surface to meet a majority of the cases. And to meet the variations, the hole must be molded, either anterior or posterior to the center, and in the direction of the cutting-edge. If the hole is anterior to the center, the cutting-edge of the crown when in position upon the root will approximate the labial line posterior to the center, the palatal line of the dental arch.

Dr. Rynear. I have listened attentively to the debate upon the two papers read this evening, and it is a matter of surprise to me that no mention has been made of the Logan crown; and still, if the question were asked of the dental profession as to which of all the methods of attaching crowns is the most popular, the reply would undoubtedly be—the Logan. In fact, were the gentlemen present asked individually the same question,—and it is safe to assume they represent the highest order of skill in the dental profession,—the response would be ten to one in favor of the same crown. Why is this the case? Simply because the Logan crown is in no way complicated; it is easy to apply, presents a good appearance in the mouth, and, while it may not be as enduring as some other, it is sufficiently so to compensate the patient for the time and expense he is called upon to meet; besides, its application is almost painless.

Such advantages are certainly sufficient to justify this popular expression of approval. Nevertheless, the Logan crown has its disadvantages; the greatest, undoubtedly, being the difficulty of retaining it in proper position during the time required for the cement to harden. Recognizing this fact, I set myself the task to try and create a crown which, while it possessed the advantages of the Logan, would lack its greatest imperfection. I am pleased to state that the crown shown you this evening, when used in combination with the "safety-pin," effectually accomplishes this; and as the pin can also be used advantageously in connection with other crowns, I am satisfied it will in time receive the generous approval of those who care to test it.

Dr. Stanbrough's method, and also that of Dr. Van Woert, although possessing evident merit, are, to my mind, complicated, and consequently only interest me so far as they may assist to find some more simple way. I shall therefore not discuss them.

Little things are more difficult to find than large ones. A man may possess the mechanical skill to devise a sewing-machine, yet lack the nice perception to invent the eye in the point of the needle. The slot in the upper portion of the "safety-pin" may justly be compared with the eye in the point of the needle.

Adjourned.

B. C. Nash, D.D.S., *Secretary.*

ANNUAL CONVENTION OF THE FIFTH, SIXTH, SEVENTH, AND EIGHTH DISTRICT DENTAL SOCIETIES OF THE STATE OF NEW YORK.

(Continued from page 1115, vol. xxxiii.)

First Day—*Evening Session.*

The convention was called to order at 8 o'clock P.M., Dr. F. W. Low in the chair.

Dr. S. B. Palmer, of Syracuse, N. Y., read the following paper, entitled

Cause and Effect.

Whatever we can see of matter in its various forms is the result of pre-existing causes. Nature works by positive laws. Science helps us to understand these principles, and, so far as we do understand them and apply them to any department of labor or industry, we may safely rely upon definite results. This assurance should stimulate every dental operator to first learn the causes in connection with their effects in relation to the fitness of various filling-materials to specific conditions of the teeth.

Nature pays no regard to earnest desires for doing good work, nor to what may be considered the choicest materials, not even to perfect manipulation, unless all is done according to the principles by which success is possible. This knowledge may be obtained by practice and experience; it comes after many years of labor and the sacrifice of numerous valuable organs. The coming dentist need not wait, as the majority have done in the past, if he will learn the principles which relate to cause and effect in filling.

This paper embraces the scientific points given in the one read before the Eighth District Society last April, which was recently published in the *Dental Advertiser*. The following is a practical sequel of that paper, rendered in popular language, so far as possible, to convey the intended meaning. The plan laid before you consists in naming some of the most distinguished conditions of tooth-structure, as seen in general practice, with scientific suggestions as to the proper filling-material to meet each specific condition. By the teachings of science, effect may be anticipated, and thereby a saving of experimentation. For illustration, let us consider the two extreme conditions of dentine found in the mouth, the normal, and the lowest grade of poorly calcified structure. With the knowledge thus obtained, apply it to the intermediate demand and supply. The analysis of dentine, as given in chemistry, is sufficiently correct for our purpose, which contains twenty-eight parts organic matter. This includes the life-principle of the tooth, and when unguarded by the mineral constituents which make the balance of a normal tooth-structure a non-conductor, is a conductor of the electric current, and subject to electrical decomposition ; when protected by the lime-salts, conductivity, decomposition, and sensibility are so diminished that no harm arises from either of the above sources. As the density of dentine falls below the normal standard, the conditions are favorable for disturbances from any one or all of the three foes mentioned.

Time and practice prove that teeth of normal density may be filled with any material which will make a durable and perfectly fitting plug, and thus answer all the requirements for tooth-preservation. The material is yet to be discovered which for durability, contouring, and popular appreciation will favorably compare with gold.

Scientifically there is a positive limit to the use of gold for tooth-preservation ; practically there can be no such line established. By chemical analysis, perfect or imperfect manipulations give a considerable margin for success or failure. This does not change the fact that not far down in the scale below the normal dentine, gold becomes a cause for undesirable effects.

On the other extreme, consider the cases not uncommon where the deciduous teeth have decayed to the gums, or where the incisors of the permanent denture have lateral cavities in all the teeth. Allowing that the age of the patient would admit of perfect operations, no observing or well-read dentist would look for success in the use of gold. There is a law and principle involved by which failure must be the result. There is a cause for such an effect, which may as well be introduced at this point as farther on, and it is the grand underlying principle involved in the adaptation of fillings to the conditions of the teeth.

This involves what is known as the "electro-chemical theory," and to avoid the unprofitable discussions which might follow from disbelief or misunderstanding of such doctrines, the substance will be given in popular terms. It would be unprofitable to go over the ground and give the causes of dental caries ; we have only to refer to the productions of able writers, given to the profession within the last two or three years, to learn what is known and received upon these points.

In accordance with such teaching, we look upon a cavity in a tooth as a cell lined with devitalized or decalcified dentine,—a receptacle for remnants of food and secretions of the mouth. Fermentation is the result of such combinations, acid a consequence, and further dissolution of the lime-constituents of the dentine an effect. Of course the above conditions include the part performed by microbes, bacteria, and micro-organisms.

For our first lesson, fix in mind two molars with cavities in the grinding-surface, of fair size, neither having caused disturbance. Without excavating either cavity, force slightly into one a pellet of black vulcanite, into the other a pellet of graphite; the effects will be widely different; not different from what would be if one plug had been gutta-percha, and the other gold. We wish to grasp a principle with which we have to do which is back of all dental operations, and thus use other materials for illustration.

Let it be understood that neither pellet could be expected to arrest decay; still the vulcanite would retard in proportion as it displaced fermenting substances, or, in other words, lessened the size of the cavity; while the graphite would increase chemical action, which up to this stage had been nothing more, by furnishing the element needed to induce electro-chemical change.

On excavating the two cavities mentioned after the plugs had been worn a few days, we should not expect to find the dentine inflamed under vulcanite, while the other which was filled with graphite would be in the condition in which we generally find dentine surrounding loose gold fillings. I think all will agree with me that a leaky gold filling will increase sensitiveness in dentine. For the real cause let us study the first simple lesson in electro-chemical action.

If a cup made of zinc should contain water in which were placed various articles of food, fermentation and chemical change would take place; the zinc cup would be dissolved in proportion to the amount of acid produced by fermentation; the process would be simply chemical. If, however, a plate of copper should be suspended in the fluid, both the copper and the zinc would be affected. There would be a difference of potential between the copper and the zinc, by which is understood that the copper would be negative and the zinc positive. There would be a difference in the electrical relations of one to the other. The tendency would be to seek equilibrium. Should the two metals be connected above the fluid, a current of electricity would be established and maintained at the loss of the zinc so long as the acid or chemical change continued in the cell.

Instead of a metallic connection being made above the fluid, the same effects would be produced by solid substances, such as meat-fiber, or food which would convey the electric current, though in a less degree. All metallic fillings in the teeth obey this principle and come under this law. The circumstances may be such as to prevent any current, consequently no harm could arise from difference of potential without the possibility of a current. When a tooth of fairly dense structure is well filled, there is no fluid between the filling and the dentine, therefore no current. Imperfect fillings admit fluids, also perfectly inserted fillings resting upon poorly calcified dentine likewise allow circulation and its effect, decomposition.

Let us imagine the third tooth, a molar, in all respects like the two mentioned; let the pellet be marble, and the effects will be different from either before mentioned; the acid as soon as formed would find an affinity in the marble instead of the lime-salts of the dentine; in effect the fluid in the cavity would be neutral and harmless to dentine. Milkmen add soda to milk when sweet, in anticipation of souring, and thus preserve it longer. Prevention of acids in a cavity or around fillings is equivalent to the expulsion of micro-organisms.

Starting upon the basis that gold furnishes no antiseptic properties to arrest decay, on the contrary being a good conductor of galvanic currents, thermal changes, etc., it is the most excitable of all metals used for fillings. In tin we find a more compatible material. Owing to the soft working of tin and its non-cohesive properties, cavities are filled with greater pressure against the dentine than occurs with gold. If tin combined the cohesive properties of gold so as to withstand attrition, it would take the place of amalgam in most operations with much better success. The preserving properties of tin are,—first, its adaptability to the walls of the cavity; second, being of low potential the current is very slight; third, the compound formed by slight oxidation fills the imperfections in the surface of dentine; electrically speaking, there is no difference in potential between the filling, fluids, or organic elements of the dentine, consequently no decay.

In amalgam we find greater complexity. Amalgam is not a homogeneous crystalline alloy, but a compound made up of coarse and fine grains of the alloy and mercury; the finer cuttings are first amalgamated, which takes up the free mercury, after which the mercury enters the coarse portions until setting is complete. Any amalgam plug is a compound of mercury and alloy, each cutting, large or small, differing in potential from the mass of amalgam which fills the spaces between the fillings. There is no guess-work about this statement, as the following tests will prove.

Take any piece of amalgam, file and polish a flat surface, no trace of alloy can be seen; wet the bright portion with weak acid, and slowly traverse the surface with a platinum-pointed electrode in circuit with a galvanometer; even the slowest passage that can be made with this point causes the needle to vibrate with the greatest rapidity possible for its length; the surface of amalgam is covered with currents,—local, active, and counter-active, each grain of alloy differing from each other in potential, according to its degree of amalgamation, and all from the more perfectly amalgamated mass which fills the spaces.

These are facts which must be met in all amalgam made from alloy cut or filed. This action occurs upon the surface of the plug only, but always when exposed to moisture, even so slight as that contained in normal dentine. Like all galvanic decomposition, there is an acid production. In speaking of gold as an agent of such action, it is a single negative element, while amalgam is a mass of elements, positive and negative, of various grades of potential. Local action is the result, and shrinkage an effect. Under certain conditions microbes die or starve for lack of sustenance; these minute currents cease because the elements become oxidized or blended upon the surface so that there is no difference in potential, and the currents no longer act. So much for the surface of the plug.

Still another action takes place in connection with the dentine; the oxides and sulphides form a crust upon the surface of the plug, which tends to increase rather than diminish its size after the first action. In this condition the amalgam presents to the dentine one element like the gold, only of a much lower potential. Again, the oxides and sulphides thrown off from the surface enter into the decalcified surface of the dentine, thereby raising it to a potential equal with the plug. So long as this condition is maintained, neither microbes nor acids will be found there. The lower grade of amalgams which do not discolor are wanting in the properties necessary,—first, to check local action; second, to equalize potentials. I say low grades, because amalgams are in use which contain gold or platinum to a degree that the surface exposed remains bright. All such alloys are very hard, the cuttings very fine, amalgamation is nearly perfect; owing to the fineness there is less oxidation, by friction the surfaces wear smooth and bright. On examination of the margin of the enamel and dentine, the line of oxidation will be found to be more distinct than that of the lower alloys; the line will be quite as dark, but not as deep,—that is, not entering so far into the dentine.

Let us now take combination fillings of gold and tin. The writer has devoted much time to this subject, mostly in former years, when there were greater prejudices against amalgam. It is needless to go over the ground at this time, since I do not use the combination; tin and gold can be so evenly distributed in foil, and fillings made that an alloy or crust will be formed upon all surfaces so that the gold cannot be seen. Such plugs resemble good amalgam, are harder to cut, do not discolor dentine, nor admit of decay around the filling; but such perfection is not always attainable, any excess of gold is visible. With too much tin a pit or groove will appear, as a consequence of galvanic dissolution. Cavities may be lined or partially filled with tin or felt foil, the tin in time turns to black paste; the tooth is preserved until a cavity is formed by the wasting of the tin.

Gold and amalgam demand more attention. As a guard-filling at the cervical border of the gums amalgam does better service in combination than an entire filling would do, for the reason that gold in contact with amalgam, by reason of difference in potential, greatly increases oxidation, thereby destroying local currents in the amalgam, at the same time furnishing sulphide, etc., which enters the dentine and thus raises its potential to equal the guard-filling. It often becomes necessary to use gold and amalgam in close proximity. As before mentioned, fillings in the mouth have potential according to their relation to the electrolytes near. Such electrolytes consist of saliva, particles of food, decalcified dentine, or fillings of other metals. The metal most negative becomes charged or stands at a higher potential than all lower in the scale.

To illustrate, let two teeth be filled in approximal cavities, one with gold, the other with amalgam; the gold plug will be at a higher potential than the amalgam. While such fillings remain separated there will be a feeble current from the gold to the amalgam through the saliva or lodgment of food which connects the metals; the inner portion of the circuit is rendered complete through the root-canals and nerve-tract. Currents of this nature are strong or feeble according to the distance of separation or the conductivity of the intervening matter between the plugs. The greater the resistance, the higher the potential of the negative element. Patients often feel the effects of equalization when a tooth that is filled, say with amalgam, becomes loose, so that in mastication the amalgam is brought in contact with a filling of gold in a tooth opposite or approximate to it. Shocks will be felt at each contact. Formerly it was taught that gold and amalgam when used in the same tooth should be separated, if possible, even by the thinnest septum of enamel, in the belief that bone was a non-conductor.

It has been my practice for eighteen years to make the connection as thorough as possible ; when the elements touch, the current is confined to the plugs. The current arising from difference of potentials soon polarizes the amalgam, and galvanic action ceases. It can easily be demonstrated that every gold filling in the mouth influences every amalgam filling, no matter whether in the same jaw or in what location ; that is, the current passing from one filling to another is distinctly manifested by the galvanometer ; such currents do no harm, but the principle is the same. The current is sufficiently strong between gold and amalgam plugs, when only one tooth intervenes, so that the tongue readily detects it. In my mouth I had a small amalgam filling of copper inserted in the center of the crown of a molar, which supported a gold clasp ; it was an experiment. The result was very unpleasant when the tongue bridged over the space from clasp to filling. It did not last many days, for reasons already given. Patients are not all observers, and if they do detect annoyances often forget them. I believe they have occasion to complain more frequently than they do of reflex nervous disturbances arising from hidden causes, which are exceedingly difficult to diagnose. For instance, patients complain of neuralgic pains ; diagnosis reveals no satisfactory cause ; two fillings are in contact in adjacent teeth, both appear perfect, and, as both are gold, the conclusion is the trouble cannot be from the contact of gold. It may be, it has been, and still is. This seems contradictory to accepted notions of potentials, and still the substitution of gutta-percha for one would remove the difficulty. It is known that occasionally teeth which have supported large gold fillings for a number of years become annoying from thermal changes without apparent decay around the filling ; on removal of the plug the dentine in the region of the pulp is found to be softened, as though the lime element had been taken away, as, indeed, I believe is the case.

Professor C. N. Peirce, of Philadelphia, at the last meeting of the New York State Society, stated just this condition, and gave his opinion that by reason of the gold there was some pathological change in the pulp, through which the lime-salts were taken out of the dentine, and thus in effect exposed the pulp. I am glad Professor Peirce has made the observation, as he will help bear the criticism which may follow respecting the cause of this condition. I am led to believe not only do fillings produce the change mentioned, but the slow approach of caries produces the same effect, which is this : A reversal of the vital current, which naturally goes to build up and support the dentine, becomes enfeebled or turned back, with the local effect upon the pulp-protection that ill-health or change of climate has upon the entire denture.

Slight excitement, like grinding or attrition upon the crown, or teeth filled upon sensitive dentine, do receive deposits which fill the entire pulp-chamber. Such stimulants are helpful. Again, when the excitement is severe no such deposition takes place ; on the contrary, the covering to the pulp is weakened from without and from within; from within by a vital principle, similar to that which causes absorption of the roots of deciduous teeth. With this understanding let us return and diagnose for the current between two gold fillings, as before mentioned. When a filling is placed in the crown of a tooth separate from any other metal, what galvanic action there may be, if any, is confined to that tooth; should the plug be so near the pulp as to cause pain it would first be in the pulp, from which it might extend to the nerve-tract; there would be little difficulty in diagnosing this condition by thermal changes. Now, let us place another tooth by the side of the one mentioned with a gold filling in it, so located that they would be in contact by food or vibration during mastication; the result would be to form a circuit with a gold conductor on the outside and the nerve-trunk beneath. The added gold would only extend the line of action from the tooth first mentioned to embrace both teeth, thereby rendering the current distinctly perceptible. It should be stated that gold fillings do not produce such currents until one or both rest upon sensitive dentine, so that the above need not hinder the use of gold in dentine of average density.

A convenient method to diagnose for the tooth most affected is with a piece of zinc, which may be held with an instrument; having wet the surface with the saliva of the mouth, touch the fillings as you would tap a tooth to detect soreness, the current will detect the tooth affected beneath the filling.

In regard to the action of gold upon amalgam: Fillings are not so distant in the mouth that the current cannot be determined between them; such feeble currents do no harm. Still, any number of gold and amalgam fillings in the same mouth impart a metallic taste after repose.

It is well for dentists that patients are not all highly sensitive or observing of chemical changes in the mouth.

The length of this paper forbids mention of zinc phosphates and gutta-percha, which are by no means unworthy of consideration. The following practical suggestions may be of benefit to those who would avoid the effects of currents and thermal changes, arising from fillings in contact with sensitive dentine:

First. The effect of all conductive fillings upon sensitive surfaces is to devitalize that portion in absolute contact; that is, sensitiveness ceases by the formation of an eschar, and not, as some suppose, by deposition of lime-salts to harden the surface; this lamina of devitalized dentine must remain, be it thick or thin. In well-developed teeth it gives no trouble, nor does it discolor. In poorly-calcified teeth its thickness increases, and decomposition is the result.

To prevent decomposition, creasote, carbolic acid, etc., have long been used, but do not meet a demand for an insulator for galvanic currents and thermal changes, and there is a demand for like conditions.

I am not prepared to announce the best material to use as an insulator. There is a field for experimenting in this direction. The principle is this: when cavities are dried with warm air and lined with varnish, sensitiveness does not return to the surface, as it does when no insulator is used. The non-conducting varnish fills the fine scratches of burs and excavators as well as the porous dentine, and quite as well serves the purpose of the oxides and sulphides, so much depended upon in the use of copper and silver amalgams.

Amalgam used in connection with varnish remains bright upon the inner surfaces, which it never does if filled upon bare dentine; this proves an important point, and there is no chemical action in a varnish-lined cavity, consequently no decay.

This practice involves many points not within the scope of this paper; one, however, should be mentioned, not to use varnish in cavities like those in the incisors, where the undercuts are bright and corners are to be built up, any intervening lining will destroy the mechanical grip which gold has upon dentine and enamel.

The question will be asked what varnish to use. I am using Canada balsam or copal in chloroform, but have not experimented sufficiently to say what is best; the principle is right, and in time supply will follow demand.

Discussion.

Dr. A. P. Southwick said the chemical action of saliva, caused by electrical currents generated by the presence of fillings of different metals, was found very frequently, and its effect was to destroy the dentine and cause the filling to become loose, and the dentine sensitive. Sometimes this occurs very gradually, and the trouble is not recognized for several years. He asked Dr. Palmer for his theory of the cause of the destruction of copper amalgam fillings. He thought that from fifty to seventy-five per cent. of all copper amalgam fillings dissolve. Those which turn brown keep perfect, but those which remain bright become pitted and dissolve.

Dr. R. H. Hofheinz said that in the paper Dr. Palmer stated that the electric action caused the tin, in a tin and gold filling, to dissolve. He had had occasion to examine quite a number of such fillings made by Dr. F. P. Abbot, of Berlin, and, while he found the tin to be disintegrated, he had not found any cavity of decay under the filling, though there was a soft, dark substance around it.

Dr. Palmer said that this was not decay, but the black paste of the disintegrated tin.

Dr. C. S. Beck said he had a patient who never would have anything but gold fillings in his teeth. Some time ago he had placed two large gold fillings, one in the bicuspid and one in the first molar. Within a short time the patient complained of annoyance from the fillings, and Dr. Beck removed one of them and replaced it with gutta-percha, when the annoyance ceased. If these fillings had been of different metals, no doubt it would have been thought the trouble was caused by electric currents; but as they were both gold, and there were only gold fillings in the mouth, he thought it must have been caused by something else.

Dr. Palmer said he thought that electrical troubles from two gold fillings might arise from a circuit being formed through the roots, which would give rise to annoyance. Sometimes there is similar annoyance owing to the presence of a bridge supported by gold bands. In such cases a shaving of gutta-percha under the band will effect a stoppage of the annoyance. In regard to the dishing out of copper amalgam. Copper amalgam has only two elements, copper and mercury. Electrical action separates the two and produces a deposit which, if it covers the surface of the plug, polarizes it, and the action ceases. If, on the other hand, from any reason the deposit does not cover the plug, the action continues indefinitely and the destruction continues.

Dr. Danforth related a case of a lady whose right central incisor was filled with gold, and who complained of pain when she took hot drinks. He removed the filling, but could not discover any cause of the trouble. He excavated the cavity and inserted another gold filling, and there was no further complaint.

Dr. Palmer said that in preparing for the new filling the sensitive dentine had been removed, and so the trouble ceased.

Dr. Barrett regretted that the admirable paper read by Dr. Palmer had not brought out fuller discussion. He thought that the effect usually ascribed to the electrical currents should be charged to chemical action. That the electrical current itself was one of the effects of the chemical action, and not a cause of that action. That the chemical action which produced the electrical current also produced the disintegration of tooth-substance and fillings.

Discussion closed.

(To be continued.)

JOINT UNION MEETING OF THE NEW JERSEY AND PENNSYLVANIA STATE DENTAL SOCIETIES.

(Continued from page 1106, vol. xxxiii.)

Dr. William H. Trueman, Philadelphia. I feel a little disposed to criticise the use of the word "pulpicide." It may be philologically correct, but I question if it explains the idea more clearly than the terms we have been accustomed to use. Our nomenclature is already burdened with many terms that might well be omitted. The essayist has divided pulps calling for treatment into three classes,—first, those which have suffered but little impairment from exposure, and those he suggests are properly candidates for conservative treatment, with a reasonable hope of success. The second class are those which have suffered considerable injury from exposure,—pulps not only sick, but sick unto death,—where we have no possible chance of preserving the vitality; and those he considers, and so do we all, are fit subjects for devitalization. But between these two classes is a very large class upon which rests the shadow of doubt. We recognize the pulp is sick, but how sick? We cannot tell. We recognize there is a departure from vitality, but whether that departure is so great as to seriously interfere with recuperative powers is a subject of doubt. How shall we treat those cases? We may attempt conservative treatment, with a very fair prospect that at some very inconvenient time we may find that it has failed, and, where it does fail, we have as a rule the tooth in a worse condition than it would have been had it been devitalized at once. We may devitalize and still run a risk, for we can never be sure of the correct deportment of pulpless teeth. We say that in later times the introduction of new methods of treatment, antiseptic and so on, has enabled us to do better work in this line than in the past. I question very seriously indeed whether we can accomplish any more in the treatment of pulps of seriously impaired vitality than has been accomplished heretofore. Various means have been suggested to ascertain the condition of a pulp whose vitality is somewhat impaired. You may remember a few years ago the small electric lamp, and, looking at it in the mouth, it seemed to beautifully illuminate the gums, and seemed at first glance a very valuable acquisition ; but when, under the direction of the inventor, I examined a mouth in which there was a crown-tooth, with the dowel extending almost to the end, and I was utterly unable to distinguish, looking through the gum, which root was filled with that dowel, I lost considerable faith in its practicability. A professional friend of mine used to give a very good illustration of the embarrassment we labor under in these cases. He suggested that we are very much in the same position as a physician would be who being called to a patient hooped up in a barrel, was compelled to examine him through the bunghole. I think we are certainly very much in the same position. If we attempt a close examination, often the very means we employ makes the death of that pulp an absolute certainty. I know a few years ago—not so often of late—a number of dentists contended that the pulp was not a particularly delicate organ, that it was amenable to treatment just the same as any other organ of the body, and then went so far as to say that in cases where disorganization had progressed to some extent they were able to amputate the disorganized parts and still preserve the vitality of the remainder. I never took any stock in that, and the fact that of late years the doctrine has ceased to be declared I think is very good evidence that their faith was not well founded.

Now, the question before us, and I think the main question in Dr. Marvin's essay, is, How are we to diagnose the exact condition of these cases? Have any of us any means known to ourselves, not generally known, by which we can ascertain whether the pulp exposed, or partially exposed, or affected by the approach of decay, is so far impaired that we have no hope of saving it, or so little impaired that we may have hope of saving it? For my own part I must confess I know of no means, and for some years I have adopted the plan which Dr. Marvin suggests, and yet he says he has not the courage to always carry it out,—that wherever there is a shadow of doubt I feel I do the best for the patient to devitalize. In illustration of this difficulty of ascertaining the condition of the pulp, we all recognize that between full normal vitality and absolute devitalization there is a very wide gap, and at first glance it would seem to reflect upon any dentist's skill who was not able to tell a vital from a devitalized tooth, and yet I not infrequently meet in practice just such cases. In my own mouth one of my superior incisors was for a number of years in that doubtful condition. It was examined repeatedly by thoroughly competent men, and they came to the universal verdict, "I don't know." There were some evidences that it was devitalized. The pulps of the teeth on each side were devitalized. There was some evidence that it still retained vitality. Some twelve or thirteen years after it first attracted my attention it was taken to Dr. Webb and found to be devitalized. The pulp had become mummified, but for a dozen years or more it was a matter of doubt. I found no one able to tell whether it was vital or not. Now, that is an exceptional case, but we have a great many in which we recognize that there is a departure from full vitality, but we cannot tell how far that departure may be, nor can we tell with accuracy the recuperative powers of the pulp. It seems to me that the main question before us is, Can we devise some way by which we can more accurately determine these conditions than at present? The question is well worthy of discussion.

Dr. C. S. Stockton, Newark, N. J. There was a period of my professional existence when I came under the leadership of our friend Dr. Atkinson, who claimed that even a part of the pulp of a tooth might be preserved and be useful. I think we have got far beyond that to-day, and the practice is not to amputate a part and attempt to preserve the remainder. Of course, in all cases there are exceptions. I recollect a case that presented itself many years ago, where in one of the buccal roots a portion of the pulp remained alive for some ten or eleven years after the other had been destroyed. My impressions are that a pulp which has once been inflamed, or has once ached, that has even been exposed accidentally in the excavation, should be destroyed; you may treat it, and though you have restored that pulp to its normal condition, it may go on comfortably for months, perhaps for years, but it will come back to you sooner or later, and you will find that it has either committed pulpicide itself or what remains of it requires it to be done at your hands.

I scarcely can recollect an instance in my own practice where that has not been the case; and my practice in such cases to-day is invariably to destroy the pulp and fill the pulp-canal, because if it dies it may become putrescent; the incipient stage, at all events, of a disease has begun, whereas if you devitalize and remove it and properly fill, that trouble is avoided. I take the broad ground, when there has been any exposure of the pulp, that it will eventually die. It is better to kill it, and it is one of the cases where death is better than life. And I think those of you who have gone through the practice of capping pulps and trusting to nature to throw out bony walls to protect this delicate, spiritual tissue, that has been referred to by the doctor in his paper, have found that nature does not throw out this remedy; so I say again, where the pulp is once exposed, kill it.

Dr. Louis Jack, Philadelphia. It may be generally known that for many years I have occupied an affirmative position in reference to the propriety of the conservative treatment of the exposed dental pulp. I arise now not to combat any statements of the essayist, but to reaffirm my confidence in carefully conducted treatment of the denuded pulp.

It may not be out of place to state that my former views coincided with those of Dr. Marvin. At length my attention became arrested by cases of evident exposure having become protected and restored to health by the occurrence of deposits of secondary dentine. These became sufficiently frequent to indicate the capability of the pulp to take on restorative action and to resume its normal relations.

In this connection I would remind you of the two notable instances of spontaneous recuperation of the dental pulp related by Dr. Miller in the April number of the DENTAL COSMOS.

The reflection must arise in each of your minds that if the pulp in authenticated examples has been known to recover its relations and function under the circumstances of full exposure, and subject to the disturbing influences of the use of the teeth as related by Dr. Miller, there should be found means of treatment for the ordinary cases occurring in practice.

It is needless here to go over the ground which I have previously covered upon this subject, since the most of you must be familiar with the articles published in the DENTAL COSMOS and in the "American System of Dentistry." I would only now repeat the summary with which the latter article was concluded, as affording to you the key to what I have considered correct prognosis.* These are :

1. Where accidental exposures have taken place, recuperation may be regarded as entirely probable.

2. When exposures have existed without any excitement of the nervous functions of the pulp, the results of treatment carefully conducted are usually successful.

3. When, after continuance of the changed relations, the pulp has become irritated by chemical influences, and some subjective indications of disturbances have arisen, the tendency is to recovery when the conditions are attended by a state of bodily vigor.

4. When the exposures have been of long continuance and from any cause objective symptoms have ensued, the probable results of treatment become more uncertain ; nevertheless, in healthy subjects recuperation may take place.

5. When, after complete or nearly complete exposure of the pulp, it has been subjected to atmospheric influences, the results of treatment become doubtful and speculative. If the state of health be vigorous, recuperation in some cases takes place. With those of low bodily tone, failure is the probable result.

6. When chronic conditions have become established, the results are increasingly speculative, and no relief can be reached without destruction of the pulp.

This summary I have found no reason to materially modify, and from my experience in the treatment of these cases I would consider it a serious disregard of the interests of the patient and a compromise of professional standing to immediately devitalize an exposed pulp which may be placed in either of the first three classifications, while in the latter three classes of cases the better course to be pursued in the majority of instances is the direct resort to devitalization.

The cases of exposure as they have occurred in my practice, which essentially is a family one, and where each patient is examined once, twice, or three times a year generally, have come within the classes 1, 2, 3. This should be the experience of those engaged in the larger cities, where well-regulated practices are not uncommon. But in the smaller cities and country districts, where well-controlled practices are less frequent, transient cases brought in by suffering and an undue proportion of the occurring exposures belonging to the classes 4, 5, 6, the results of conservative treatment under these conditions are liable to be unsatisfactory.

My chief purpose in occupying your attention now is to present some of the statistics of an extended practice in this direction.

With a view of making a report of cases, I commenced in March of this year to test the capped pulps as they came before me for observation at the periodical examinations of my patients.

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* Page 168, vol. ii, "American System of Dentistry."

This testing of cases continued through three months, but was curtailed in May by the pressure of work, and had for the same reason to be stopped.

It is a source of regret that I am unable to give you the results of a year's testing, by which the greater portion of over five hundred cases treated in this manner—extending over a period of twenty-one years —would have been brought under observation.

The number of cases examined in the three months was 125, of which number 88 were vital, and 37 had become devitalized or were not responsive to cold.

Of these, there was of 1871 1 case and alive; of 1873, 2 cases, 1 of these dead; 1875, 1 case; 1876, 5 cases, 4 dead; 1877, 2 cases; 1878, 4 cases, 1 dead; 1879, 3 cases, 3 dead; 1880, 5 cases, 2 dead; 1881, 5 cases, all vital; 1882, 8 cases, 5 dead; 1883, 9 cases, 4 dead; 1884, 9 cases, 5 dead; 1885, 16 cases, 2 dead; 1886, 15 cases, 2 dead; 1887, 7 cases, 3 dead; 1888, 19 cases, 2 dead; 1889, 15 cases, 3 dead.

This report exhibits the apparent fact that the proportion of devitalizations was much greater in the early than in the later years. It would be modified somewhat, I believe, by a whole year's observation, but it is my belief that the principal reason is to be attributed to the want of skill in the earlier periods and the inefficient therapeutic treatment, or, it would be better stated, the over-medication of the earlier years.

Among these cases there are some of the greatest interest. For one individual there are seven cases, of which two are dead. In these cases in nearly every instance there were long-continued and acute subjective disturbances following the treatment.

Another person had between 1876 and 1886 seven cases, with two dead, and few disturbances. Both devitalizations were of cases pertaining to 1876.

Two patients had each three cases, all dead, wherein no treatment or care appeared to be of avail.

Another had four cases done respectively in the years 1878, 1880, 1882, and 1888. The latter two have recovered by deposits of secondary dentine. In the last one the period between the treatment and the observation was twenty-three months.

In reference to recoveries by secondary dentine, I have no final report to make. In the "American System" I reported twenty-three cases, of which seventeen were detailed. Since then no tabulation has been made. It is probable, however, that many of the quiescent cases which have not been opened have recovered by such deposits.

It would be well at this point in the discussion to consider what indications may be found to determine the state of the pulp, a question brought prominently forward by Dr. Marvin, and given further prominence by Dr. Trueman.

This is an important question. Upon it rests the prognosis of the treatment. I believe it is within our power to know from the symptoms of the case whether the condition of the pulp has probably passed beyond salvable limits.

It is not difficult to determine from the manifestations whether the condition is one of *hyperemia*, consequent upon the existence of hyperesthesia, or whether a state of congestion or inflammation of the organ exists.

In the former there are probabilities of recovery; in the latter the possibilities of ultimate disorganization are immanent. In the first state the indications are subjective only; in the latter they are principally objective.

In the surgical management of the cases, all of the carious matter should be removed without causing pressure of the contents of the cavity upon the pulp or by contact of the pulp with instruments.

In regard to the complete removal of the carious matter, since the importance of its infectious character has been made clear, I have been increasingly careful in this connection, and now believe the lessened percentage of losses to be partly due to this care. In the insertion of the cap and the placement of the filling, the greatest care is required to avoid compression.

In the therapeutic treatment, it should be observed as a cardinal principle that the dental pulp is impatient of medication. It is intolerant of drugs. This is probably due to the fact that the pulp is devoid of the means of conveying away any except such substances as are completely soluble, and at the same time are not irritating to its elements. This consideration leads to the conclusion that there are very few medicaments that can be acceptable to a structure having the characteristics of the dental pulp.

I have elsewhere pointed out that the pulp is remarkably tolerant of such fluid substances as find their way to it by filtration through the gelatinous residue covering it, and that under these conditions it generally has considerable recuperative power, and also have stated that when it has become completely exposed, so as to be acted upon by crude substances, conservative treatment is of questionable propriety.

It here becomes an important question to raise, whether the causes of the disturbances of the pulp are due to those heretofore considered, namely, the changed relations and the chemical irritation, or whether the active cause may not be the infective influence of germ-life. This can only be determined by careful investigation by the positive methods pursued in the study of bacteriology.

The same principle applies in reference to its relation to medicaments. The remedy which is not carried forward into the general circulation appears to remain, and to act as an irritant.

In the classes of cases which have been indicated as amenable to treatment, my present view is that topical treatment should be confined to the class of disinfectants, and of these such as are not chemical irritants. In later years I have used pure carbolic acid, on the ground that its action is superficial upon the pulp. Since it is very feebly soluble in water, it is reasonable that a very short contact of this chemical would not allow any portion to enter the tissue, and yet the momentary touch would be sufficient to disinfect the surface of the cavity and carbolize the point of exposure.

For some months I have been using as a covering paste the combination of oxide of zinc with a nearly saturated solution of aristol in oil of gaultheria. At this time I can only report that there appears to be less subjective disturbance. Indeed, I am safe in saying there are fewer after-symptoms.

The treatment for subjective indications of irritation continues the same, and consists in the application to the surface of the gum of aconitum and chloroform in combination.

The physical treatment consists in the avoidance of thermal irritation. This is fulfilled generally by the use of non-conducting filling-materials. Notwithstanding that there are cases which may be immediately filled with metal, the greatest safety lies in their avoidance.

The position I have occupied in connection with the conservative treatment of the pulp has been from the first a tentative one, but has been favorably supported by the results of experience, and has been increasingly satisfactory, as above indicated. It must, however, be conceded that there is no kind of operation in dental surgery which requires more care than this, or where there is greater need of the employment of careful analysis to determine the course to be pursued, or none in which the elements which constitute the real physician come more into the foreground.

(To be continued.)

[Copies of the Annual Address of the President of the Pennsylvania State Dental Society may be had upon application to Dr. L. Ashley Faught, 1331 Arch street, Philadelphia, Pa.]

AMERICAN DENTAL ASSOCIATION.

(Concluded from page 1031, vol. xxxiii.)

FOURTH DAY—*Morning Session.*

THE association was called to order at 9.50 A.M., President Harlan in the chair.

The following standing resolution, offered by Dr. C. N. Peirce, was adopted :

Resolved, That this association now in session direct that sections belonging thereto shall in the future be prohibited from inviting individuals, who are violating the code of ethics, to hold clinics or to give other exhibitions before this body.

Section III was passed, and Section IV, Histology and Microscopy, was called.

Dr. Frank Abbott, chairman, read the report of the Section.

Dr. Abbott also read a paper prepared by Dr. Carl Heitzmann and himself, entitled "Senile Atrophy of the Upper Jaw."*

Dr. A. O. Hunt, Iowa City, Ia., characterized the paper as the first effort, within his knowledge, to demonstrate the destruction or wasting away of the bony tissues. It is well established that the destruction of the soft tissues is a retrograde process, in full keeping with the process of formation, an idea which this paper brings out with regard to bone-tissue. It is therefore a valuable contribution in that it seeks to establish a universal law for the government of protoplasm, both in building up and tearing down tissue, and he presumed it would lead to more investigation in that direction.

Dr. L. D. Ingersoll, Keokuk, Ia., was more interested in this paper of Dr. Abbott's than in any other he had read on histological subjects for many years. It reaches a practical case which every operator is brought in contact with nearly every day. We wonder what becomes of the tissue of the aged when we see it wasting away. We shall be obliged to come to the conclusion that the same functions build up and afterward tear down tissue. In the case of the temporary teeth the pulp first builds up the dentine, and in due time takes it down. Dr. Abbott shows that in absorption there is first a process of solution of the mineral portion of the bone, and then the action by the ordinary absorbing functions. In nutrition the solid food is put in solution and then incorporated into the tissues. Histologists teach too much from embryonic conditions, while we are dealing with matured and perfected tissue, which is very different from embryonic tissue. How, then, are we to understand the brain-tissue of the man from a microscopical observation of the brain-structure of the infant? The wood-worker cannot understand the peculiar qualities of strength and endurance in oak from a study of the acorn. Nor can we gain an accurate idea of the structure of the matured insect from the observation of the chrysalis; or of the full-grown bird from microscopical study of the egg. This paper shows the value of the investigation of the matured tissue, and more of that kind of investigation is wanted. One thing he cannot understand. How is it, if there is a return to the cartilaginous condition of the bone, that the bone is so fragile in old age?

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*See page 1, current number.

Dr. Abbott. The contents of the bone-corpuscles of the young and middle-aged become converted, as the persons grow older, into little embryonic bodies,—medullary bodies,—and these in time become infiltrated with lime-salts, which eventually fill the bone-corpuscles, so that it becomes a section of bone, consequently friable, as compared with what it originally was. It does not remain cartilaginous.

Section IV was passed, and Section V, Materia Medica and Therapeutics, was called.

Dr. John S. Marshall, Chicago, read a paper entitled "Electricity as a Therapeutic Agent in the Treatment of Hyperemia and Congestion of the Pulp and Peridental Membrane."*

Dr. G. J. Friedrichs, New Orleans, La., wondered if there was not some mind-cure in the case presented. The great effect the mind has on the result of treatment was well illustrated in the speaker's experience. Electricity, the first time it was applied, cured a lumbago for him in two weeks, when in the ordinary course he would have recovered in six weeks. The next time it had no effect at all, although the application was kept up at least a month. He believes it is really a good thing, and would recommend it especially for patients who cannot be relieved otherwise.

Dr. Abbott was reminded by the instrument used by Dr. Marshall of an appliance made by himself some years ago somewhat similar in appearance, except that at the back end there was a bow which would spring back and forth. At the bow ends were little cups, about three-quarters of an inch in diameter and nearly half an inch in depth. These were packed with sponge which was saturated with a mixture of tincture of aconite-root, chloroform, and alcohol, each one ounce, and Magendie's solution of morphine, twelve drops. He used it as a local anesthetic for the extraction of teeth. Holding the sponges against the sides of the gum over the tooth for about five minutes, the desired effect was produced.

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*This paper was published in the DENTAL COSMOS for November, 1891, page 969.

Dr. G. J. Friedrichs could not see the object of the alcohol, as aconite is an alcoholic tincture and answers every purpose.

Dr. Abbott replied that he had described the appliance just as he had used it for a good many years. He does not use electricity with it, but he would suggest that electricity would intensify the action of anything of the kind. By making the sponges electrodes the remedy can be forced deeply into the tissue, producing the desired effect without trouble in a few minutes. That is a common practice with surgeons to-day, with much more satisfactory results than if absorption alone is relied upon.

Dr. W. P. Horton, Cleveland, O., spoke of an apparatus which had been invented by his son by which sensitiveness of dentine in excavating is overcome. He hoped that at the next meeting of the association his son would be able to be present and exhibit it.

The matter was discussed by Drs. Shepard, Butler, and Horton.

Dr. Hunt wished to ask the essayist, with reference to the deposit in the pulp, whether he meant the calcified tissue, or blood-clot, or what?

Dr. Marshall replied that he meant what is generally understood by it, that a clot of blood had plugged up the vessels, that the arterial supply of the pulp had been cut off, probably by the floating into it of some little floccule of fibrin, or perhaps the formation of a blood-clot.

Dr. A. G. Friedrichs, New Orleans. We all know that as far as our knowledge goes in regard to the use of electricity, speaking medically, there are really no definite data upon which to base its application. Dr. Marshall's suggestion is a very good one. Nothing which has the least show of being productive of good should be tabooed. Under such conditions as the paper described, he should certainly try to get some data to either prove or disprove the benefits which might be derived from the use of electricity under the circumstances spoken of by Dr. Marshall.

Dr. W. H. Morgan, Nashville, Tenn., claimed to know perhaps less about electricity than anyone else in the audience, but he had experienced marked relief from rheumatic troubles since using an appliance called an electropoise [demonstrating the benefit he had received by walking freely unsupported]. He simply gave his experience as an illustration of the value of what is called electricity. He does not know what it is. Experts had declared that no electricity could be discovered, and no current could be felt when the apparatus was applied, but it did some wonderful things. [The subject was further discussed by Drs. Abbott, J. Taft, and L. D. Shepard.]

Dr. Marshall thought the discussion had taken a wide range. He could not think the gentlemen who had suggested the idea that the beneficial effect of electricity in the treatment of disease was owing to mind-influence were earnest, because it is known that certain forms of tumors in the human body can be reduced by the action of the galvanic current. This has been proved hundreds of times, and is a settled point. It acts by stimulating the absorbents, and in that way the tumor is carried away. Another thoroughly well-established fact brought out in the paper is the production of hyperemia of the surface of the body by the application of the positive galvanic current, and the reverse of that by the negative current. You can drive the blood out of a part or you can bring it in. Another point: When he first began this treatment he used his index finger as an electrode, having his assistant hold the lip away. At the end of about five minutes the current decomposed the water and the secretions under his finger-nail, when it became so painful he could not bear it. The trouble was that acids were formed there, caused by the decomposition of the fluid by the electric current. These things are not understood, but through this influence some of the most valuable therapeutic effects of the remedy are had. He had cited only one case out of several to illustrate the point he wished to bring out. Another case was that of one of the most talented women in Chicago, a physician, for whom her dentist in excavating a cavity in a bicuspid, had slightly exposed one of the horns of the pulp, which was capped and the cavity filled with oxyphosphate. In a few days there was that grumbling, disagreeable sensation often observed, and on the speaker's suggesting the galvanic current the patient expressed her lack of confidence in it. He urged her to let him try it, which she did, and in less than a half-hour the tooth was quiet. Several weeks afterward the tooth again annoyed her. The current was applied three times, one sitting of twenty minutes a day, and the tooth is comfortable, and the pulp, which, under ordinary circumstances, if let alone, would have been dead in three or four days, is still alive. The value of this treatment is not in pulpitis, but in the early stages of hyperemia, which, if let alone, will go on in all probability to congestion and death of the pulp. Taken in the early stages, the hyperemia may be relieved and the pulp saved.

He had not yet tried the introduction of medicaments into the system by the galvanic current, but before leaving home he had discussed the matter with Dr. McIntosh. His idea was to try certain remedies, as, for instance, the tinctures of aconite and iodine, in pericementitis, applying them with a sponge as Dr. Abbott suggested, to see if the medicament could be carried into the tissue so as to bring about a more rapid action.

Dr. E. A. Stebbins, Shelburne Falls, Mass., on motion of Dr. Truman, detailed his method of using nitrate of silver in the treatment of decay, and showed a patient illustrating the effects of the treatment. He uses the crystals because they contain less impurities than the stick. The nitrate forms a definite compound with albumen, which is dissolved in but few substances. The caustic is so hostile to microbes that they keep away from it. The time to apply is when the teeth begin to decay, and the effect is more satisfactory on buccal and labial surfaces than on other portions of the teeth. When this boy was four years old he complained of his second temporary molars, especially the upper ones, hurting him so badly that he could not brush them. On examination the entire buccal surfaces were found decayed, and an application of the nitrate was made. That was in March, 1886, and they have not been treated since, and there has been no further decay. The approximal cavities were treated in June, 1887, and again in November, 1889, and they have no appearance of active decay now. He uses the remedy not merely in temporary teeth, but in the permanent teeth also, and has saved them for years, without any excavating, filling, or cutting. He pulverizes the crystals in a mortar, dries the cavity, and with a wood point slightly moistened applies the pulverized crystals to every part of the decay. There is no fear of getting too much in; he has had no injurious results; the nitrate will not affect the teeth where they are not decayed. In May of this year he had examined one hundred and twenty-four cavities treated by this method among the public-school children in February and March, 1888, and eighty-seven of them were perfectly successful. In some, other parts of the teeth treated had been attacked, while the portions treated had remained intact.

The usual votes of thanks were adopted, and the newly-elected president, Dr. W. W. Walker, of New York, was installed, and on assuming the chair, returned his thanks to the members.

On motion, Dr. Corydon Palmer, of Warren, O., was granted ten minutes to address the association on the subject of Operative Dentistry. His remarks were directed against the too prevalent practice of having gold show in the mouth, especially through the capping of the lower incisors, producing an effect which he characterized as a disgrace to the people and to the association; and against the extraction of the deciduous teeth, which should, he said, never be extracted, but by proper treatment be maintained in their places until lost through the operation of the natural laws. He pointed out that these teeth yielded readily to treatment and that the result of their premature extraction was deformity, and urged upon his hearers that their duty was to decline to extract, and to use their influence upon others to the same end.

The president appointed on the publication committee Drs. Edwin T. Darby and A. W. Harlan; and the executive committee was authorized to appoint the local committee of arrangements.

Dr. E. A. Floyd, Paola, Kansas, spoke briefly of the value of the meeting, which he characterized as the most notable and most useful gathering he had ever attended.

Adjourned to meet at Niagara Falls on the first Tuesday in August, 1892.

SOUTHERN DENTAL ASSOCIATION.

FIRST DAY—*Afternoon Session.*

(Continued from page 877, vol. xxxiii.)

DR. GORDON WHITE, Nashville, Tenn. Anyone who will try to mash a little ingot of tin and one of gold with pliers will see how much easier the tin will yield. The easy and perfect adaptation of tin is what makes it so successful. The speaker has used copper amalgam at cervical walls and it is successful, but he does not like it as well as tin, of which he uses a great deal in these compound operations. He commenced the use of tin seven or eight years ago, and he has yet to see a failure in the operations of that kind which he has made with it. About two years ago he had invented a crown, which he called "a cast grinding surface crown." In cutting the band he cuts it a little obliquely at the point where it is to be soldered. After soldering, it is placed on the root and ground to articulate with the opposing teeth, beveling toward the palatal side and allowing the buccal side to remain the length of the desired cusp. It is then removed and the point crimped and the required knuckles made, replaced on the root, filled with Parr's fluxed wax, and the patient directed to close the mouth, which gives the bite of the opposite tooth. With a syringe throw on it a stream of ice-water, remove, trim the wax, and form the cusps. Invest with one part each of white sand and pumice-stone and two parts of plaster, being careful to place the buccal side of the band down, and burn out the wax, which leaves a coating of flux ; fill the mold with twenty-carat solder, which is prepared by cutting it up very fine, rubbing up on glass with borax and water, and then drying thoroughly. The blowpipe is then applied (with care to heat well from the bottom), and the solder flows into every part left vacant by the wax, giving a perfect cast, which only needs to be polished and placed in position with the certainty of a perfect fit. Molars and bicuspids are made in this way. When the root is very short and a pin is required, it should be put in position before inserting the band and wax. The combination gold and porcelain crown can be made by this process. This method has given him more satisfaction than any other, and it is certainly simpler than those in common use, besides overcoming the difficulty of getting a correct articulation.

Dr. J. Y. Crawford, Nashville. In preparing roots for treatment, it is possible to get approximately at the roots of all teeth, except those having a right-angle curve, by means of the Morey drills. We have been claiming to remove all the tissues of the canals, but we have not always done it. With a well-selected and good set of these instruments, there is little likelihood of going through the tooth, unless great violence is used. The way to use them is to feel your way, never forcing the instrument.

Dr. H. E. Beach, Clarksville, Tenn., wished to commend the method of making crowns described by Dr. White, but one point not mentioned by him which might not occur to the novice is to be sure to fill the space full enough. As to the effect which amalgam has on a gold band, a demonstration is proof. Mercury will attack the gold so as to cause it to give way, and a clasp placed on a tooth with an amalgam filling will absolutely unsolder. Mercury and copper do not amalgamate ; it gets hard, but the mercury is free, and if put over a flame it will stew out. If you put gold in contact with copper and amalgam, the mercury will act upon the metal for which it has the greatest affinity.

The further discussion of the subject was postponed, and the association adjourned.

SECOND DAY.

The day was devoted to clinical operations.

Evening Session.

The association met at 9 P.M., President Wright in the chair.

The subject of Operative Dentistry was passed, and Prosthetic Dentistry and Dental Hygiene were called and passed by for the present.

Pathology and Therapeutics was called ; a paper by the chairman of the committee, Dr. W. H. Gingrich, Norfolk, Va., was read by Dr. Herring. The title of the paper was "The Etiology of Caries." A synopsis follows :

It is apparent that the investigations of Dr. Miller are generally accepted as showing the true theory of what takes place during the ravages of this disease, but what causes the deficiency of form and structure, and the favorable environment in which the pathological phenomena exist? And why is each succeeding generation more and more a prey to these destructive and consuming micro-organisms? Is dental caries a disease *per se?* Many persons who are in other respects ideals of physique and health suffer from caries, while others who are frail and delicate are oftentimes exempt from its ravages. The manifestations of many of the diseases which affect the teeth deleteriously are not understood, so that their effects cannot be measured. Of these, syphilis holds first place as the disturber of assimilation and nutrition in the dental formative organs. Its effects range from slight imperfection of quality or form to the complete destruction of the tooth. The special effects are to reduce the growing germ and give birth to a stunted tooth, with peculiar marks, which are diagnostic. The nervous system is most profoundly affected, and there can be no doubt that much of the nervous debility of the human family is due to syphilis. Quoting from numerous authorities as to the protean manifestation of syphilitic sequelæ, the writer queried if it was unreasonable to include dental caries in the dreadful list. Most authorities agree that caries ensues in grooves, pits, roughnesses, and surfaces which will afford lodgment for foreign substances, which imperfections can only be accounted for on the supposition of nervous debility. If the functions were normally performed, the juices of the mouth would not only tend to preserve the teeth, but to neutralize the deleterious effects produced by foreign substances in grooves, pits, etc. Observation shows that the disease is not confined to fissures and points affording lodgment for foreign substances, but manifests itself on surfaces which appear to be sound. Approximal surfaces are frequently affected before the pits and grooves, at the point of capillary approach, the very points nature intended to defend by a drop of oral fluid. He therefore reached the conclusions that caries depends upon, first, defective development; second, morbid environment,—both the result of nervous derangement, and, judging from the havoc syphilis can produce in other parts of the body, it can directly or indirectly also produce caries. Several cases had come under his own observation in confirmation of this idea, but he preferred to offer this from the practice of Dr. J. R. Woodley: Of six children in a family, three were born while the parents were living in affluence. Afterward reverses came, the father resorted to drunkenness and vice, and contracted syphilis. After this three other children were born. The first three had teeth of perfect form and structure, and none of these had ever required a capital dental operation. The last three have defective teeth which baffle every effort for their preservation.

Dr. Gingrich believes that if syphilis can be eradicated from the human family, many, if not all the other supposed causes of caries would disappear, and the generation to come would be exempt from the misery it entails.

Dr. E. P. Beadles, Danville, Va., had put in some large amalgam fillings for a patient a year ago. He afterward learned that at the time the fillings were made the patient was suffering from syphilis. On looking into his mouth recently he was surprised to find the teeth looking well and the fillings perfect. In another case he operated some six months ago for a young man whose teeth were good, and he naturally expected the work to stand well. When the patient came again, a short time ago, the tooth which had been filled was soft and a bad condition existed all around. He could not understand why the tooth should so change in structure, until he learned that the patient was suffering from syphilis. The teeth may change greatly in two or three months, and he agreed with the writer of the paper that syphilis had a powerful effect on them.

Dr. W. H. Richards, Knoxville, Tenn., thought there might be a question as to whether the changes referred to by the preceding speaker were the effect of disease or of its treatment. He had been informed that changes in the teeth of persons so afflicted were noticeable. As regards the specific effects of that disease upon tooth-substance, he has had one family under his care in which the parents have extraordinarily fine teeth. The father was given to dissipation, and the children's teeth are the poorest excuses for teeth he has ever seen. The only conclusion he can reach is that the effects of this disease have been developed in these children's teeth, which break down in the shortest time and do not repay the labor bestowed upon them. The mother's teeth are not affected.

Dr. D. D. Lester, Christiansburg, Va., has a case in mind upon which he would like to get light. A gentleman, forty-five years old and in good health, had teeth of very fine quality, and none were missing. They became painful and one tooth was extracted, when it was found that a large part of the root had been absorbed. Since then another has been lost, showing the same phenomena, and a third seems to be going the same way. [In reply to a question, Dr. Lester said that the process observed was absorption, he should say. There was no evidence, to his mind, of necrosis.]

Dr. D. R. Stubblefield, Nashville. There is probably no one at all acquainted with the effects produced by syphilis who does not know that its manifestations are right along the line of the dermoid tissues. The hair is affected by it, lesions of the skin are produced by it, and it may well be that the teeth in the development of the disease may be injured by its influence. As to the cause of disease in the teeth, the latest investigations show it to be due to morbific agents which are localized in their effects until entrance is obtained. Decay is frequently found at the points of contact between contiguous teeth, which, acting by capillary attraction, hold fluids, and in this area micro-organisms may live and work their effects. In other portions of the teeth there is defective structure,—deep sulci, for instance, and there are accidental occurrences opening gateways to the inner structure, the breaking down of which is comparatively easy when once an entrance is obtained. There is no question that this breaking down is easier when from the action of heritage through impairment of the parents' vigor the offspring show defective organism. Causes which would break down perfect organs have easy work when they attack points less capable of resistance.

On motion, it was ordered that the paper by Dr. J. B. Patrick, of Charleston, S. C., on the "Origin of Pus," be read.

Dr. Patrick read his paper, an abstract of which follows:

Of all the topics that could engage our attention, the history of pus comes most directly to the front in a general survey of the underlying principles of our pathological science. Witness the detailed preparations in every department of the healing art to combat the evolution of pus, or suppuration, and wage determined warfare against this purulent termination of inflammation under the avowed supposition that its presence implies the presence of bacteria, which in the opinion of many contribute to increased irritation of the tissues, inducing the birth and multiplication of pus-cells. Whether this theory of pyogenesis is correct, and what may be the relation between bacteria and pus, it is not necessary now to discuss, further than to direct attention to the real biological meaning of pus, in the present state of science. The most striking feature of pus-cells, or corpuscles, found floating in this fluid is that they give character to the entire product known as pus,—a character so distinctive as to make pus recognizable in the smallest conceivable quantity in the tissues or fluids of the body. As an example, the essayist quoted the diagnosis by Donné of incipient abscess of the breast from pus-corpuscles found under the microscope in the milk of a woman supposed at the time to be perfectly healthy, but who shortly developed a large abscess of the breast.

The cardinal point, then, in the study and recognition of the veritable nature of pus is the interpretation of the pus-cell. The greatest confusion once prevailed respecting the true individuality of this pus-corpuscle ; and it was not until a forced resemblance to the white cell of the blood was generally observed that any definite idea existed regarding it. The idea of their identity, pointed out by Addison nearly half a century since, was reluctantly accepted, because it seemed impossible that the leucocytes could escape through the walls of the vessels. Cohnheim minutely described their actual migration, by their amœboid endowments, through the attenuated walls of the capillaries within the area of the inflamed territory, though this did not account for the rapid multiplication of such cells in profuse suppuration ; but it was next ascertained that these leucocytes immediately upon their emigration began to proliferate within the interstices of the tissues, and even induced a similar multiplication of the connective-tissue corpuscles. It must be remembered that a transudation of plastic exudates from the vessels of the inflamed part was known to be one of the earliest phenomena of inflammation ; into this the leucocytes find their way, and thus a fluid matrix for the subsequent growth and generation of a multitudinous progeny of cells, is formed.

Pus in its incipience is thus seen to be a product of the blood itself, and in its earlier stages resembles the vital organic processes of nutritive secretion in a marked degree. It is only when untrammeled in its progress and exaggerated in its vital (though perverted) activity that it takes the character of a truly morbid process. Thus, if the initiative step expressed in the effusion of exudative lymph be at once arrested, absorption takes place, and inflammation is said to terminate in *resolution ;* should the emigration of leucocytes have occurred to a limited extent only, conjointly with diffusible lymph and the fibrillization of its fibrin, then a slow but sure step toward tissue-formation occurs, and the inflammation results in *organization ;* should the cell-proliferation gain the ascendancy and the degenerated and metamorphosed corpuscles wreak their destructive influence upon surrounding parts, the inflammatory invasion ends finally in *suppuration.* Although the exodus of the white corpuscles was denied, Schafer's recent experiment of "feeding the white corpuscles" presents irrefragable evidence of the fact. Taking advantage of the well-known fact that the white corpuscles of the blood, in common with other amœboid characteristics, exhibit the tendency to take into their interior small particles of insoluble materials floating within their range, he put frogs' blood into a small glass tube, hermetically closed both ends, and in an hour's time a clot was formed, and the lymph around it was full of leucocytes. Placing a drop of this colorless fluid under the microscope, he proceeded to feed them by introducing a drop or two of India ink well rubbed up in a normal solution of table-salt. The black particles of the India ink were soon ingulfed into the protoplasm of the amœboid white cell. This having been determined, he utilized the discovery by injecting the insoluble particles of an ink solution into the blood-vessels of an animal; then, on producing inflammation at a special part, leucocytes containing similar particles of India ink were found in the intervascular spaces of the inflamed part, proving that they must have come from the blood.

(To be continued.)

PHILADELPHIA DENTAL CLUB.

At a meeting of the Philadelphia Dental Club, held November 28, 1891, it was

Resolved, Whereas Dr. Charles A. Kingsbury, who had been a member of our association from its organization in 1872, and who became endeared to us by his high intelligence, the goodness of his heart, and the probity of his character, has under the Divine Providence been removed from this life, that we unite with his friends and relatives in mourning his departure, and will keep in remembrance his cheerful Christian influence.

Also *Resolved*, That this note be engrossed upon the records of the club, and a copy be sent to his family, and to the dental journals for publication.

D. N. McQuillen, *Secretary.*

AMERICAN ACADEMY OF DENTAL SCIENCE.

The twenty-fourth annual meeting and dinner of the American Academy of Dental Science was held at the Copley Square Hotel, Boston, November 11, 1891. The early part of the meeting was taken up with the reading of the annual reports, from which it was learned that the society is in an active and prosperous condition. Four deaths were reported to have occurred during the past year, and two new members have been admitted.

A paper by Dr. F. N. Seabury, entitled "Methods of Filling Teeth Forty Years Ago," supplemented by an exhibition of several forms of instruments used in those earlier days, and a paper by Dr. George C. Ainsworth, describing a method of regulating, furnished ample discussion for members previous to listening to the annual address delivered by Dr. George S. Allan, of New York, upon the conclusion of which adjournment was made for the annual dinner.

The following-named gentlemen were elected to serve the Academy for the ensuing year:

Dr. C. A. Brackett, of New York, president; Dr. Eugene H. Smith, of Boston, vice-president; Dr. Charles H. Taft, of Cambridge, recording secretary; Dr. E. N. Harris, of Boston, corresponding secretary; Dr. V. C. Pond, of Boston, treasurer; Dr. E. C. Briggs, of Boston, librarian; Dr. William H. Potter, of Boston, editor; Dr. F. E. Banfield, Boston; Dr. F. N. Seabury, Providence; Dr. Thomas Fillebrown, Boston, executive committee.

CHARLES H. TAFT, *Recording Secretary*,
15 Brattle Square, Cambridge.

ODONTOLOGICAL SOCIETY OF CHICAGO.

AT the annual meeting of this society, held in November, 1891, the following-named officers were elected: Dr. G. Newkirk, president; Dr. W. B. Ames, vice-president; Dr. E. Noyes, secretary and treasurer; Dr. Thos. L. Gilmer, curator; Dr. E. D. Swain, member of board of censors. EDMUND NOYES, *Secretary*.

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DENTAL SOCIETY ANNOUNCEMENTS.

ANNIVERSARY MEETING OF FIRST DISTRICT DENTAL SOCIETY.

THE following is the program of the anniversary meeting of the First District Dental Society of New York, to be held January 18, 19, 20, 1892, at the Academy of Medicine, New York city.

The essays to be read are:

"Pus Formation—Revived," by Professor D. R. Stubblefield, Nashville.

"A Plea for Replantation as a Cure for Chronic Alveolar Abscess," by Professor John S. Marshall, Chicago.

"Some Thoughts on Transformism," by Professor C. N. Peirce, Philadelphia.

"Borders between the Natural and the Artificial in Bridge- and Crown-Work," by Dr. Calvin S. Case, Jackson, Mich.

"Adenoid Growths, Mouth-Breathing, and Thumb-Sucking, and their Relation to Irregularities of the Teeth," by Dr. Norman W. Kingsley, New York.

Dr. Kingsley's paper will be illustrated by a number of casts of faces, models of jaws, and regulating appliances.

The following distinguished gentlemen have agreed to discuss the above papers: Dr. J. E. Garretson, Dr. C. N. Peirce, Dr. James Truman, Dr. S. H. Guilford, Dr. E. C. Kirk, and Dr. Chas. J. Essig, Philadelphia; Dr. J. Taft, Cincinnati; Dr. John S. Marshall, Chicago; Dr. D. R. Stubblefield and Dr. J. Y. Crawford, Nashville; Dr. C. S. Stockton and Dr. S. C. G. Watkins, New Jersey; Dr. Thos. Fillebrown, Boston; Dr. G. L. Curtis, Syracuse; Professor Chas. Mayr, Springfield; Dr. Frank Bliven, Worcester; Dr. F. T. Van Woert, Brooklyn; and Drs. J. N. Farrar, Geo. S. Allan, and Carl Heitzmann, New York.

The following gentlemen will give new and interesting clinics: Dr. J. Y. Crawford, Nashville; Dr. Geo. V. I. Brown, Duluth; Dr. Sydney S. Stowell, Pittsfield; Dr. F. T. Van Woert, Brooklyn; Dr. A. H. Gilson, Boston; Dr. John L. Gish, Jackson, Mich.; Dr. S. C. G. Watkins, New Jersey; Dr. W. F. Rehfuss, Philadelphia; Dr. W. F. Davenport, New York, and a number of others with whom we are still in correspondence. In addition, there will be a number of new instruments, devices, etc., shown by various manufacturers. The clinics will be held in the large clinic room of the academy, where there will be space enough for everything to be seen by all who attend.

The Wednesday morning's session will be devoted to a mass meeting of all interested in the Dental Protective Association. Dr. Crouse will preside, and several prominent men will make addresses.

The Trunk Line Association have agreed to sell tickets from points on their roads for one and a third fare, on the following conditions :

(1) That at least one hundred persons who have traveled to the meeting on some legitimate form of railroad shall be in attendance ; which fact shall be certified to by the secretary of the society, and also by a special agent of the railroads who will be in attendance.

(2) That all other provisions written on the back of the certificates shall be complied with.

Persons desiring to attend may bring with them any member of their immediate family. They must pay full fare to New York, and be sure to take a receipt in the form of a certificate from the ticket agent where they purchase ticket. This certificate, when signed, will entitle holder to return for one-third fare.

The profession are cordially invited to attend.

RODRIGUES OTTOLENGUI, *Chairman Executive Committee*,
115 Madison avenue, New York.

EDITORIAL.

"WHERE SHOULD PAPERS BE PUBLISHED?"

THIS query forms the caption of the editorial in the *International Dental Journal* for December, 1891.

The following extract from the proceedings of the New York Odontological Society, published in the October issue of the same periodical, italicized and quoted as follows in the editorial alluded to, furnishes the *raison d'être;* the quotation being "a portion of Dr. Bogue's remarks in reply to Dr. Meriam":

> "In making application as one of the members of your executive committee to a gentleman for a paper to be read before this society, I was met with almost a prompt refusal, on the ground that papers read here would not be published in the *Dental Cosmos.* I undertook to argue the gentleman out of his decision, but was met by the *strong argument* that the *Dental Cosmos* had attained a position that made it the most *widely read of all the dental journals;* if he had taken the trouble to get up a good article he wished it to be read as widely as possible. . . . Now comes the question, Are we sufficiently strong to fight our own battles? Are we yet able to take the position as an independent profession, . . . casting aside personal self-interests and laboring for the good of others?"

We do not coincide with the view taken by the editor of the *International* that the statement "exhibits a condition of mental antagonism not at all creditable to the individual quoted," and we fail to see that "the reasoning that would lead to the refusal of a paper on such grounds must be very defective." The editorial in question conveys the impression of a misapprehension on the part of its author regarding at least one important function of dental journalism, as well as a misunderstanding of the mutual relations of the DENTAL COSMOS and the dental profession, and we embrace the opportunity afforded to present our views on the question—Where should papers be published?

Just why the editor of the *International* believes it to be an indisputable fact that there is a decrease in the number of readers or in the number of those who are willing to write for societies and journals, is difficult to understand. Our observation and experience point to the opposite conclusion. A belief in such an unfortunate state of affairs must include the admission that the dental profession has ceased to progress either in a scientific or literary way, which it has not.

It is an indisputable fact that when dental practitioners have anything worth saying, they will say it; and a moderately thorough examination of current dental literature will demonstrate that they are saying it increasingly, both as regards quantity and as regards quality. Furthermore, the busy practitioners who are compelled to "engage in extra hours of labor, oftentimes far into the night, to keep up with the increasing demands of the clientele," are the very men, in our opinion, who do read and make the literature of our profession.

His classification of those who read, as well as the relative number of readers in the three classes, seems to us not only arbitrary but unwarranted, and we doubt if in the dental profession a single representative of class three, which he believes contains probably three thousand, viz: "those who take a journal solely for the advertisements," could be found anywhere, unless he was at the same time a dealer in dental supplies.

For the sake of argument only, we accept as correct the estimate that "only about six thousand dentists in the United States take any journal regularly." If this be true, and taken in connection with the number of subscribers on our lists, it simply follows that all who take any journal regularly take the DENTAL COSMOS; and if his suggestion to "take any twenty dentists and interrogate them as to the contents of certain journals" be carried out, while it may possibly justify the statement made that "dentists are not, regarded as a whole, devoted readers of their own literature," it will certainly develop the fact that those who do read any portion of it read the DENTAL COSMOS. This we believe to be the case, and because we think the DENTAL COSMOS meets the qualifications of a journal best adapted to the wants and needs of all grades of practitioners of dentistry. These qualifications in general are so ably expressed by the editor of the *International* that we quote from him as follows: "That journal is the best and surest medium for original thought which bases its reputation on the highest standard attainable, and which meets the needs of the most cultivated class in the profession. The labor to sustain such journals is one worthy of our highest endeavor. It must be above selfish motives. It must recognize that in such periodicals nothing is lost. They are the ones preserved, and eventually become centres of reference. Libraries gladly receive them, and they develop in the largest sense not only the instructors of the present generation but those which are to follow."

But they should do more than this. The field of a journal "devoted to dental and oral science," or "devoted to the interests of the profession,"—it matters not, for they practically amount to the same thing,—should not limit the sphere of its educational activities to meeting "the needs of the most cultivated class in the profession," or to the development of the "instructors" of this or succeeding generations. A high-class dental journal is essentially an instructor, in the broadest definition of the term, and in pursuance of its function in this regard it should meet the requirements of practitioners of every grade in the profession, even of the hypothetical class who "take a journal solely for its advertisements"; for if one such could be found, he surely stands in greatest need of the kind of instruction which it is the legitimate business of a journal to furnish, and he might perchance, if not designedly, find instruction in the regular reading matter when he had exhausted the quota of advertisements.

Granting, with reference to the class of readers "who desire to keep fully abreast with the progress of scientific development, and who will endeavor to read everything as it appears, not only in one but in several journals," "the most cultivated class in the profession," and "the instructors of the present generation," that the leading journals may be "reduced to a common basis," they are still far from equality when their value as media for the wide dissemination of thought is compared. Other things being equal, this difference is a vital one.

The extensive republication of their valuable articles abroad is a distinction shared in common by all journals which contain papers worthy of it, and goes without the saying.

We heartily accord to our esteemed contemporary the field and position it assumes for itself, and cordially reiterate the sentiment expressed in our introductory editorial, viz: "In relation to its contemporaries the DENTAL COSMOS bids a cordial Godspeed to all who labor with it for the realization of the dental ideal,—the advancement of our common calling;" but we think it should put a broader construction on its educational possibilities, with the ambition of extending its benefits to the whole dental profession.

As we view the situation at present, we must regard the statement of the member of the New York Odontological Society as exhibiting neither "a condition of mental antagonism" nor defective reasoning, but the ordinary perspicuity of a man who, having two avenues before him, decided in favor of the one which promised the largest return, both as regards himself and the audience he desired to instruct,—a decision which we think is justified by the facts in the premises.

What is meant by "The battle can be, *must be*, fought within our own lines," we do not know. So far as we are aware, no declaration or even rumor of war, sufficiently related to this subject to make the meaning clear, has been uttered, and whose or what "lines" is for that reason equally unintelligible.

We think that the number of dental readers, as well as writers of papers for societies and journals, has increased to an extent sufficient to furnish audience and material for the maintenance of the whole number of legitimate dental periodicals in the field; and by legitimate we mean those whose standard of excellence the editor of the *International* has so ably defined.

MONTHLY RECORD OF PATENTS.

We call attention to our monthly record of the dental patents issued by the United States Patent Office. The publication of this list will occur regularly in each succeeding issue, and our readers will thus be kept informed with regard to all American patents allowed upon methods and devices which have a bearing upon dentistry.

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OBITUARY.

DR. W. H. LOCKWOOD.

Died, at Racine, Wis., October 26, 1891, of consumption, W. H. Lockwood, D.D.S., in the thirtieth year of his age.

Dr. Lockwood was born at Racine, Wis., June 23, 1862. He entered upon the study of dentistry about 1881 with Dr. A. H. Amos, of that place, and commenced practice there in 1884. He was a graduate of the Baltimore College of Dental Surgery, class of 1889.

On June 25, 1889, Dr. Lockwood was married to Grace E. Leadley, of Chicago, Ill., who survives him.

DENTAL LEGISLATION.

PRINCE EDWARD ISLAND'S DENTAL LAW.

We copy herewith from the *Royal Gazette* "an act respecting the practice of dentistry and dental surgery," in the Province of Prince Edward Island, which was assented to July 15, 1891 :

Whereas, it is desirable to regulate the practice of dentistry in the Province of Prince Edward Island,

Be it enacted by the Lieutenant-Governor, Council, and Assembly as follows :

1. This act may be cited as "The Prince Edward Island Dental Act."

2. That no person shall practice the profession of dentistry or dental surgery in the Province of Prince Edward Island without having first received a certificate as hereinafter provided, entitling him to practice dentistry or dental surgery.

3. That such certificate shall be issued by the Provincial Secretary, upon production to him of diploma of graduation in dental surgery from the faculty of any Canadian dental college, or the faculty of any Canadian university having a special dental department, or from any such institution duly authorized by the laws of Great Britain or any of her dependencies, or from any dental college in the United States of America recognized by the National Board of Dental Examiners of the said United States of America, or from any recognized dental institution of any other foreign country which required at the time of issue of such diploma or license, attendance at a regular course of lectures, and an apprenticeship of not less than two years ; or a person who has been in regular practice in Prince Edward Island as a dentist or dental surgeon for a period of six months immediately preceding the passage of this act, and it shall be the duty of the persons claiming to be entitled to the certificate required by this section to produce to the said Provincial Secretary evidence, satisfactory to him, of his being entitled thereto.

4. And it is further enacted that notwithstanding anything herein contained such certificate as aforesaid may be issued to any dental student who at the time of the passing of this act was actually apprenticed to any surgeon dentist in this Province, and who shall actually at the time of applying for such certificate have served apprenticeship of at least two years, and who shall also produce a certificate to the Provincial Secretary from such surgeon dentist testifying to the effect that the applicant was duly apprenticed before the passing of this act for at least one month, and has at the time of application completed an apprenticeship of at least two years. Provided always that nothing herein contained shall be construed to require physicians, surgeons, or others to take out such certificate for the purpose of qualifying them to extract teeth.

5. That before any such certificate is granted, the applicant shall pay the Provincial Secretary the sum of five dollars.

6. After three months from the passing of this act, any person not holding a valid certificate issued by the said Provincial Secretary as aforesaid, who practices dentistry or dental surgery, except extracting teeth, shall be guilty of an infraction of this act, and shall be liable upon summary conviction before the Stipendiary Magistrate of the city Charlottetown, or the Stipendiary Magistrate of the town of Summerside, or before any two Justices of the Peace, for the county in which the offender resides, to a fine of not less than five dollars nor more than twenty-five dollars besides costs of suit, to be levied by distress of the defendant's goods and chattels, or in default thereof to be imprisoned for a period not exceeding one month.

7. That no person who has not received the certificate required by this act shall recover in any court of law any fees of money for any professional services or operation performed by him, nor for any materials provided by him in the practice of dentistry or dental surgery.

8. That nothing in this act shall be construed to prevent surgeons or physicians from temporarily filling teeth or otherwise attending to them, for the prevention or cure of toothache.

PUBLISHER'S NOTICE.

THE DENTAL COSMOS FOR 1892.

WITH this issue the DENTAL COSMOS enters upon its thirty-fourth annual volume. As announced last month, the commencement of the volume is marked by a departure from its long-time typography. This change might perhaps be announced as the assumption of a new dress, but the dress is more properly the old one made over, since the identical materials with a little new trimming are used in it. But whether its dress be new or old, the DENTAL COSMOS is here to serve the needs of the dental profession, and it will continue to discharge its duty with the same fidelity that has made it the sheet-anchor of dental journalism in the past.

This issue is sent to all subscribers for the last volume, whether they have renewed or not. Will those whose subscriptions have expired kindly do us the favor to send in their renewals at the earliest moment?

THE S. S. WHITE DENTAL MFG. CO.

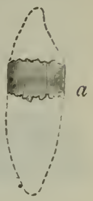
HINTS AND QUERIES.

AN INCIDENT OF OFFICE PRACTICE.—About two years ago, a patient, age eighteen years, suffering from an alveolar abscess, called for treatment. I found the lower right lateral incisor discolored but intact. The cuspid was missing. An opening into the pulp-chamber was made through the lingual surface of the tooth, and medicaments were injected through the tooth and out of the fistulous opening upon the gum near the root. After three months of daily treatment I filled the root with carbolized cotton and the tooth-cavity with gutta-percha. After an absence of six months the patient returned, and desired the extraction of the incisor. The old trouble having returned, he had sought the advice of a physician, who took him to one of the leading medical colleges, where he was informed that there existed a cancerous affection of the alveolus. He was advised to have the tooth extracted, and was instructed to return and submit to an operation on the maxilla.

I insisted upon once more trying to save the tooth. There now appeared a slight swelling at the right of the fistula. I removed the filling and cotton dressing, and found it clean, but the tooth seemed loose and protruding. Again noticing the absence of the cuspid, I questioned the patient as to the cause, and obtained from him this history: At the age of ten years he suffered from a fractured jaw at this point, the result of a kick from a horse. The permanent teeth were just erupting, but all healed nicely, with perfect alignment and occlusion of the teeth. The lower incisor, however, commenced to grow dark from that time, and an abscess formed, but as it gave him little or no trouble he had not mentioned it until I questioned him. I now concluded that the missing cuspid was fighting for freedom. As the incisor was loose and becoming denuded, I extracted it. With a probe I could now distinctly feel and locate through a lateral opening in the socket the enamel surface of the missing tooth. By the exercise of some force with an instrument I succeeded in removing what proved to be the remains of a cuspid tooth. The parts healed perfectly in a short time; and when an artificial substitute had been made and inserted, the patient was discharged cured.

The figure shows at *a* all of the tooth which remained. The pulp-channel was open and distinctly marked.

Query: By a microscopical examination of the discharging pus, could the presence of a tooth undergoing slow dissolution have been diagnosticated?—C. R. Sholl, Reading, Pa.



To Reset a Broken-off Pivot Tooth.—It sometimes happens that an artificial tooth-crown mounted on a pivot breaks off, leaving the pivot firmly fixed in the root, from which it may be for several reasons impracticable to remove it. In such a case I employ an engine trephine (Fig. 1) to bore a groove, *C*, in the root end *A*, Fig. 2, around the pivot, *B*, to a depth consistent with the strength of both the pivot and the root. A hole, *D*, is then drilled in the palatal part of the root end to the same depth as the groove around the pivot. From a gold or platinum tube of the size of the trephine a section, *C′*, Fig. 3, is cut and soldered to a piece of platinum wire, *D′*, which just fits the hole *D* in the root *A*, Fig. 2. The tube and wire are then put in place, and the tube made flush with the pivot and root end. A plain tooth, *E*, Fig. 4, is selected, ground, and backed with platinum, *F*, so that a part of the backing may be bent and cut as shown at *G* to the shape of the root end, and drilled at *d* to fit over the wire *D′*, Fig. 3. Hard wax is then melted to unite the backing to the wire, so that all may be withdrawn from the root, invested, and soldered to form a contour which when subsequently finished will make a strong, smooth crown-back, *H*, Fig. 5, which shows in section the several parts of the crown as reset with suitable thin cement on the pivot and root before described. It is obvious that such a crown is secure in its seat, and a number of them so set have proved the method to be a success.—Emil Amend, D.D.S., Metz, Germany.

Fig. 1.

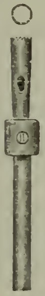


Fig. 2.

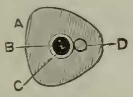


Fig. 3.

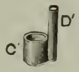


Fig. 4.

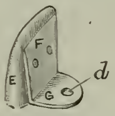
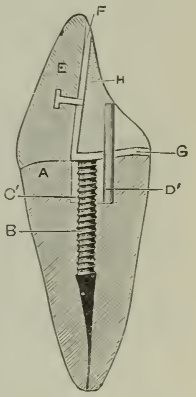
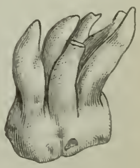


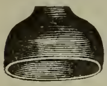
Fig. 5.



Dental Abnormality.—Not long since I extracted a six-rooted superior first molar for a lady apparently thirty-five years of age. I found it necessary to exercise considerable force in removing the tooth, at the same time bringing away several pieces of alveolar process. I have extracted a number of teeth for the same patient, but all, with this exception, were normally formed. This is the first case to my knowledge where a tooth had this number of roots, all well developed. It was the cause of intense suffering before it was removed. Having seen like cases recorded, I deemed this one worthy of publication.—W. G. Hales, Mineral Point, Wis.



ABSCESS EVACUATOR.—Dr. R. Walter Starr's device for evacuating an alveolar abscess by means of a flanged glass tube and a compressible bulb was an improvement in the right direction, and I have supplemented and simplified it by adapting Dr. J. B. Wood's patented polishing-cups to the like uses. My method is to take one of these cups, say No. 2 (see illustration), and plug the mandrel-hole with a piece of gutta-percha, which must not project on the inside of the cup. Then wet the inside of the cup, and place it over the gum so as to cover the opening into the abscess. Gently press the cup flat upon the gum, and upon removing the finger the elasticity of the cup will cause sufficient suction to fill the cup with the contents of the abscess, which by repeatedly applying the cup may be completely evacuated. Medicaments placed in the tooth-cavity may likewise be drawn through the sac and sinus, and immediate root-filling be practiced with greater prospect of success than by any of the other modes of practice.—THOMAS M. HUNTER, D.D.S., Fayetteville, N. C.



A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

The abbreviations of titles used are those common to bibliographical work, and will, it is presumed, be readily comprehended by any one familiar with dental or scientific publications. Any explanation will be gladly furnished by the compiler. A star (*) indicates a Thesis.

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LIST OF UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING NOVEMBER, 1891.

November 3.—No. 462,267, to A. C. Miller and G. F. Wells. Dental engine.
“ “ No. 462,409, to J. O. Keller. Dental engine hand-piece.
“ “ No. 462,530, to Oscar Booth. Hand-piece.
November 10.—No. 462,703, to F. E. Hansen. Pestle and mortar.
“ “ No. 462,763, to P. Grabler. Teething bit for children.
“ “ No. 462,896, to E. D. Eddy. Angle attachment for dental engines.
“ “ No. 463,113, to C. W. Holbrook. Rawhide mallet.
November 17.—No. 463,309, to E. Schulze. Tooth-cleaner.
“ “ No. 463,348, to G. W. Archer. Dental chair.
November 24.—No. 463,855, to J. T. Calvert. Dental engine.

THE

DENTAL COSMOS.

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ORIGINAL COMMUNICATIONS.

SOME THOUGHTS ON TRANSFORMISM.

BY C. N. PEIRCE, D.D.S., PHILADELPHIA, PA.

(Read before the Anniversary Meeting of the First District Dental Society of the State of New York, January 18, 1892.)

IN offering you the following thoughts upon a subject which has been entitled "Transformism," and which you will doubtless think has scarcely a collateral connection with our specialty, you will, I trust, indulge me in a few words of preface.

The dental profession has already earned, and holds without question, the title of a "liberal profession." It does this in consequence of the position assumed by the large majority of its members regarding patents and secret processes of whatever nature. These they have not only discouraged, but when possessed by its members such have in consequence thereof forfeited their rights to full membership in its best organizations. Also knowledge which is deemed of value or advantage belonging to one is, as a rule, freely given to all others desiring or appreciating the same.

Its position in the healing art, with its marked capacity for anticipating and preventing suffering, as well as relieving the same, classes it with other important and honorable professions, and secures for it a position at once dignified and unrivaled, not one attempting to question that which has been so well earned. But as a learned and scientific profession, how does it stand? Is it broad and catholic in its literature, or do not the limits of a specialty largely comprise its intellectual and scientific work?

It is in the conviction that this latter position is the one in which it may be found that I have been induced to present to you the following paper. While the theory to which I shall direct your attention and endeavor to sustain is of comparatively recent origin, the title "Transformism," so far as name is concerned, is the latest born, as it has been previously known as the "evolutionary philosophy," the "Darwinian hypothesis," the "origin of all things by derivation," "creation by law," etc.; and though it is of so recent a date as a recognized philosophy, it ranks to-day with the oldest and most honored systems so far as the influence it is exerting upon theological, religious, moral, and scientific thought, is concerned. It has been born of man's earnest, honest, and unremitting desire to know of the things around him; of nature's depths and beauties, and above all of her plans and methods. It is not, as theology, the child of fetichism, nor does it show relationship to any other system or philosophy, but has arisen as from a primitive stalk—*de novo*. To many thoughtful people the theory in its wide scope and influence has been the source of much anxiety, but by such it is now largely regarded as the expression of law active throughout infinite time and filling infinite space, the same law which has without date controlled and is still controlling the development of every germ, seed, or egg; presiding over the creation of worlds and all things therein,—"one law and one energy pervading all space and stretching through all time;" a philosophy which in its simplicity is but a record of what we see about us on all sides and at all times; a philosophy which sees the universe of to-day, but the child of the universe of yesterday, and that of yesterday but that of the day before with modifications, and in like manner all our to-days and yesterdays but the product of the days preceding them, with never a cessation in this continuous and everlasting procession; a philosophy which has been nurtured by no metaphysical mother, but Nature's own child, her highest conception, her healthiest and most enduring progeny.

It was in 1728, and during many subsequent years, that the department of botany was receiving from the hands of that father of modern scientific biology, Linnæus, a remarkable impetus through his wonderful industry in the collection, arrangement, and classification of plants. In this absorbing labor this great naturalist accepted without question the almost universal theory or belief in the fixity and immutability of species. He believed, however, that a group of plants differing in minor peculiarities, though closely resembling one another, might all be descended from a single ancestor or pair of ancestors; but while admitting that this differentiation might occur within the radius of certain restricted limits, he threw the weight of his knowledge and authority in favor of what is now termed the creative hypothesis and the then prevalent doctrine of the unchangeability of typal forms. The several species or groups into which he arranged his widely-differing plants he believed to be the descendants each of a solitary progenitor, or of a primitive couple, called into existence at the beginning of all things by the direct interposition of a designing Creator. He regarded the world of organic life, animal as well as vegetable, as composed of so many well-defined types, each separate, distinct, and immutable, each capable of producing its like, and each unable to vary from its central figure except within very narrow and unimportant limits. The learning, the honesty, the popularity, the authority of this then widely-renowned scientist was an almost insurmountable barrier to an assault upon his popular and prevalent fortifications.

But during the latter half of the eighteenth century there was in the atmosphere a new era of investigation, an awakening into a fresh order of things; a more skeptical and critical attitude was permeating the world of science; thinking and prophetic naturalists were asking the meaning of *specific* distinctions. Linnæus had already admitted modifications within certain limits. If, then, these were occurring within limited time, how much greater or more divergent would they become with unlimited time? A natural question, indeed, for a thoughtful mind. In 1707, George Louis Leclerc Buffon was born, on the 7th of September; at twenty-five years of age he succeeded to an independent fortune, by which he was enabled to devote himself entirely to scientific pursuits. Living most of the time in Paris, with the royal garden and museum at his command, he devoted himself to the biological sciences in particular, and at once commenced to collect materials for his Natural History, the first volume of which made its appearance in 1749, and was followed by others, the last of which was published some years after his death, which occurred in 1788. This great work, "Natural History—General and Particular," "has the merit of being the first work to present the previously isolated and apparently disconnected facts of natural history in a popular and generally intelligible form." *A second edition was commenced in 1774 and completed in 1804, in thirty-six volumes quarto.* "Buffon was the first great biological innovator who ventured to suggest the possibility of the rise of species from one another by slow modifications of ancestral forms," and at a time when it was uncertain whether his novel and heterodox views would bring down upon their author fame and reputation, or the Sorbonne and the Bastille. In this great work he frequently refers to the suggestion that plants and animals may not be confined to fixed and immovable limits of species, but may vary in every direction from a common center, and that in this way one kind may be gradually and slowly evolved by surrounding influences from the type of another; and also that fundamental likenesses in animals with divergent characteristics suggest the novel notion of descent from a common ancestor. In view of this possibility, he sees no reason why not only the ass and the horse, but even man himself, the monkeys and all vertebrate animals, might not be viewed as forming divergent branches of one and the same great family tree. Every such family, whether animal or vegetable, he believed might have sprung from a single stock.

Granting that nature could by slow variation produce one species in the course of direct descent from another unlike it, then the further and inevitable conclusion which he drew was that no limit could be set to her powers, and that the whole field, embracing animals and vegetables, living and having lived, could with unlimited time and space be developed from a single primordial being.

Notwithstanding, Buffon guarded himself by putting his theories in an ironical form, and endeavored to protect himself by an afterthought. "But no; it is certain from revelation that every species was directly created by a separate fiat." The Sorbonne was too much for him; its orthodoxy had been offended, and he was forced to make his submission and demand pardon from the Paris faculty.

But the thought was born, and its growth was not to be checked by the displeasure of the Sorbonne, the fear of the Bastille or the guillotine. This seed given to the wind by Buffon was wafted to every country, and wherever it found lodgment in scientific soil it germinated and brought forth fruit. So before the close of the eighteenth century speculation as to the origin of species was rife in all quarters of the scientific world.

In France, Geoffrey St. Hilaire, in his teaching, cautious and conservative, though free from prejudice, stated, in 1795, his conclusion that all species are really derived by a modification from one or more primitive types. It was in a paper entitled "The History of the Lemurs and Apes of Madagascar," written this same year, that Geoffrey St. Hilaire first gave expression to his views on "the unity of organic composition." Nature, he observed, presents us with only one plan of construction, the same in principle but varied in its accessory parts. In 1822 the second volume of his "Anatomical Philosophy" was published. In this he gives an account of the formation of monstrosities on the principle of arrest of development and of the attraction of similar parts. When, in 1830, he proceeded to apply to the Invertebrata his views as to the unity of animal composition, he found a vigorous opponent in Cuvier. The discussion between them attracted the attention of the scientific throughout Europe. St. Hilaire held that there is in nature a law of compensation, or balancing of growth, so that if one organ takes on an excess of development requiring nutrition, it is at the expense of some other part; and he maintained that since nature takes no sudden leaps, even organs which are superfluous in any given species, if they have played an important part in other species of the same family, are retained as rudiments, which testify to the permanence of the general plan of creation.

Goethe in 1790 was taking a deep interest in his scientific work, and in this he aspired to detect the secrets of nature. In his prophetic vision he saw the great scheme of evolution, to him an original revelation, which has since been so successfully applied to all phenomena of the natural and moral world; Goethe longed for the time and leisure that he might perfect these ideas and base them on a solid foundation. While this great man added little positive value to the treasury of science, he gave it the impetus of a fertile imagination, which is so often the forerunner of the development of great and valuable truths. In his anatomical studies and the comparison of the skeletons of men and other animals, he made the important discovery that the intermaxillary bone which exists in the lower mammalia was found in the human subject in a rudimentary state. In the young it is distinctly seen, but with advancing years it is united to the other bones. The discovery also that the skull itself is only a development of the vertebræ of the spine was by him made a little later. In his botanical studies he clearly saw that all the different parts of the plant, except the stem and the root, might be regarded as modifications of the leaf; and that leaf, calyx, corolla, bud, pistil, and stamen were all referable to the same type; and that whether a plant produced leaves, flowers, or fruit, depended on the differentiation of the nutrition which it received.

In 1794, Dr. Erasmus Darwin, of England, the grandfather of the distinguished author of the "Origin of Species" (Charles Darwin), published his most important scientific work, "Zoönomia," a treatise on the laws of animal life, in which he not only adopted Buffon's theory of the origin of species by evolution, but also laid down as the chief cause of such development the actions and needs of the animals themselves. According to this author, animals came to vary from one another chiefly because they were always altering their habits and voluntarily accommodating themselves to new actions and positions in life. He says, "In the great length of time since the earth began to exist, perhaps millions of ages before the commencement of the history of mankind, would it be too bold to imagine that all warm-blooded animals have arisen from one living filament, which the great First Cause endued with animality, with the power of acquiring new parts, attended with new propensities, directed by irritations, sensations, volitions, and associations, and thus possessing the faculty of continuing to improve by its own inherent activity, and of delivering down these improvements by generation to its posterity, world without end?" Lamarck, the fourth in line of naturalists whose courage sustained him in the maintenance of opinions, in the absence of any friendly support, published in 1778 his first work, "French Flora," by which the student in botany was enabled to determine species. He also published in 1815 his great work on "The Natural History of Animals without Vertebra." His studies in the department of the Invertebrata were of marked advantage to all subsequent zoölogists. His effort to establish the great division of Articulata by grouping together all animals having a segmented construction indicated his great desire to reduce to system and order the whole organization of animals. But his name to-day is chiefly of interest to the modern scientist on account of his theory regarding the diversity of animal forms. He announced, and endeavored to sustain, the same idea which had been previously favored by Buffon, that species were not through all time unalterable, and that the more complex were, or might have been, developed from pre-existent simpler forms.

He explained the whole organization of animals and formation of different organs by four laws, first assuming that life originally or primitively originated by spontaneous generation through a fortuitous combination of matter with heat and moisture. With this beginning his laws acted as follows :

1. "Life by its proper forces tends continually to increase the volume of every body possessing it and to enlarge its parts, up to a limit which it brings about."

2. "The production of a new organ in an animal body results from the supervention of a new want continuing to make itself felt, and a new movement which this want gives birth to and encourages."

3. "The development of organs and their force of action are constantly in ratio to the employment of these organs."

4. "All which has been acquired, laid down, or changed in the organization of individuals in the course of their life is conserved by generation and transmitted to the new individuals which proceed from those which have undergone those changes."

These may all be summed up in the statement that altered environment leads to altered wants and habits, and these lead to altered organs, by the modification, growth, or suppression of those previously existing. As an illustration, ruminants or Herbivora being pursued by Carnivora, their legs have grown more slender and their toes fewer. Certainly, no writer more recent than Lamarck has more clearly or tersely expressed the influence of changed environment than has he in the following language : 'Everything which Nature has caused individuals to acquire, or lose, by the influences of the circumstances to which their race is long exposed, and consequently by the influence of the predominant employment of such organ or its constant disuse, she preserves by generation to the new individuals proceeding from them, provided that the changes are common to the two sexes or to those which have produced these new individuals."

That the changes must be common to both sexes in order to have them transmitted might be stated to be wholly a Lamarckian idea. Lamarck also attached great importance to the influence of new wants acting indirectly by stimulating growth and use. Darwin, in place of this, subsequently attributed very grave importance to the effects of accidental variations acting indirectly, by giving advantage in the struggle for existence. It was in 1801 that Lamarck first gave to the world his speculations on the origin of species; and from that date to the day of his death, in 1829, he continued to devote his whole time and energy to the elucidation of this interesting and important subject. A bold, vigorous thinker, with a fearless habit of forming and maintaining his own conclusions without regard to prevalent or preconceived ideas, Lamarck pursued the subject in the most industrious and determined fashion, and proclaimed his profound conviction that all species, including man, were descended by modification from one or more primordial forms.

He paved the way for his successors by arousing and directing the attention of the reading public to the fact that all change in the inorganic, as well as the organic world, was the result of law and not of a miraculous and special interposition. Such, then, was the status of this question of "Transformism," or evolution, as presented and discussed by the intellectual and social world, when Charles Darwin, in his twenty-third year, set sail December 27, 1831, for a five years' cruise on the brig, the "Beagle," under the command of Captain Fitzroy, whose mission it was "to complete the unfinished survey of Patagonia and Terra del Fuego, to map out the shores of Chili and Peru, to visit several of the Pacific archipelagoes, and to carry a chain of chronometrical measurements round the world." This was an essentially scientific expedition, and what could be more appropriate than that it should be accompanied by a naturalist who would undertake the collection and preservation of the animals and plants discovered on the voyage? Charles Darwin, on the recommendation of his teacher, Professor Henslow, volunteered his services without salary, and partly paid his own expenses, on condition of being permitted to retain in his own possession the animals and plants he collected on the journey. This five years' cruise proved a marvelous epoch in the great naturalist's career. It was a personal acquaintance with a great part of the entire globe and of the beings that inhabit it. To observe the fauna and flora of the tropics, and compare them with those of the more northern climates, would be a practical and most admirable lesson in solving the problems suggested by the theory involving the "adaptation to environment" and natural selection or "survival of the fittest;" and even more than this it would accomplish, by preparing a most congenial habitat for the embryo which subsequently developed into the "Origin of Species." The presence or absence of certain animals and plants in varied localities, with their similarities and differentiations, must constantly have brought to the naturalist's mind the inquiry, Evolution or creation?

When Charles Darwin landed in England, October 2, 1836, on his return from the voyage, he was in his twenty-eighth year. When he published his first volume of the "Origin of Species," he was in his fifty-first year, twenty-three intermediate years having been devoted to collecting and arranging material for the one crowning effort of his life, "the settlement of the question of organic evolution." In doing this he erected a monument to his memory the glory of which time cannot efface.

In 1842, Charles Darwin settled at Down, in Kent, where for the rest of his days he passed his time among his conservatories, his garden, his fowls, and his pigeons. It was here he began one long and memorable experiment characterized by a patient and painstaking method of inquiry. One single illustration will show to what extent this was true of all his labors. Desiring to know the influence earthworms exerted upon the soil, he spread broken chalk over one of his fields through which twenty-nine years later a trench was dug to test the results. Where in history do we find another naturalist waiting so long and patiently to discover the outcome of a single experiment?

In a letter which this distinguished naturalist wrote to that brilliant German student and author, Haeckel, he says, "It seemed to me probable that allied species were descended from a common ancestor. But during several years I could not conceive how each form could have been modified so as to become admirably adapted to its place in nature. I began therefore to study domesticated animals and cultivated plants, and after a time perceived that man's power of selecting and breeding from certain individuals was the most powerful of all means in the production of new races. . . . Having attended to the habits of animals and their relations to the surrounding conditions, I was able to realize the severe struggle for existence to which all organisms are subjected; and my geological observations had allowed me to appreciate to a certain extent the duration of past geological periods. . . . The idea of natural selection through the struggle for existence at once occurred to me. Of all the subordinate points in the theory, the last which I understood was the cause of the tendency in the descendants from a common progenitor to diverge in character."

But when Darwin realized that every species of plant and animal must always be producing a far greater number of eggs, seeds, germs, or young offspring than could possibly be needed for the maintenance of the species, and that of these a large number must always perish from generation to generation for want of space, food, air, etc., he at once recognized that the survivors of each brood must be those best adapted to their environment, the weaker being eaten, starved, overrun, or in some way crowded out, while the few that survived would be those possessing strength, color, shape, or some other quality which by virtue of adaptation to environment gave them protection or special means of defense against an aggressor or enemy. In this way, groups of animals or vegetables when placed under conditions differing from those to which they were previously subjected, immediately begin to undergo changes of structure fitting them for the new conditions; and through successive generations these changes continuing, ultimately the new or adopted conditions become the ones best adapted. In this manner the development of every faculty, physical or spiritual, moral or intellectual, may be modified or improved, retrograded or exalted. And in the same way new species may originate through the intervention of intermediate causes. Through the same influences we have sandflies gray or sand color, for self-protection; grasshoppers green or grass color; butterflies resembling leaves; insects in shape and color like dead sticks; and a multiplicity of beings mimicking the objects upon which they live, on which they rest, or by which they are protected; also possessing or acquiring the appearance of other animals in form, color, and action for the protection thus afforded. As instances, flies of some varieties resemble wasps; certain butterflies are, or seem to be, distasteful to insectivorous birds, and others not distasteful acquire the same form and color for protection. Assuming that our domesticated fowls have descended from birds accustomed to deposit their eggs upon the rocks, we have at once an explanation for one end of the egg being larger than the other. With these few illustrations we venture to assert that natural selection, or survival of the fittest, is the explanation offered as an important factor in accounting for the origin of permanent varieties or species. It is simple, intelligible, and we believe sufficient in connection with generation and the transmission of ancestral peculiarities.

[To the "Encyclopedia Britannica," and "Charles Darwin," by Grant Allen, we are indebted for much of the material embraced in the above paper.]

(To be continued.)

SOME IMPRESSIONS CONCERNING DENTAL EDUCATION AND COLLEGES.

BY C. E. BENTLEY, D.D.S., CHICAGO, ILL.

(Read before the Chicago Dental Club.)

MEN are ill disposed to listen to the grumblings of the pessimist. The dyspeptic's growl seldom provokes the earnest consideration of serious men. It is the optimist who is loved the world over. It is he who says,—

"Let the world slide, let the world go.
A fig for care, and a fig for woe."

"Laugh, and the world laughs with you;
Weep, and you weep alone."

But the optimist's philosophy is faulty in that he would have us "take no thought of the morrow; for the morrow shall take thought for the things of itself." He would have us conform to the accepted truths of to-day without investigating their worth for the demands of the morrow.

If optimism were universal, how filled with mythological gods our Pantheon would be!

The iconoclast is of questionable usefulness who, without offering a substitute as good or better, with one daring sweep smashes before our eyes the gods at whose shrines we have been wont to worship.

If I presume to criticise the methods of our institutions, or arraign the systems of education of dental students, you naturally will ask, What better have you to offer? To save myself from the charge of sublime egotism, or the accusation that I know all about how to run dental colleges, etc., I frankly admit that I have nothing to offer for which I make any claim of originality, but simply a concurrence in the opinion of minds much abler to dispose of these subjects than I.

I may also say, incidentally, that by use of the term profession I do not wish to imply that I consider the specialty of dentistry a distinct profession in itself, but a specialty of medicine. I simply use the term because of the momentum given to it by common usage, but by no indorsement of mine that it is a separate and distinct profession.

The preliminary training of the student has often attracted the attention of the profession: some claiming that such preparation should be preferably made in the dental office; others claiming that the molding of the raw material in the college is desirable for the reason that having absorbed the methods of his preceptor the student has often to unlearn much that was learned, thereby impeding his progress. Much can be said for and against either method. The writer, however, is disposed to the theory that advocates previous training, but is opposed to the training which consists principally in cleaning cuspidors, running errands, and being closely closeted in the laboratory. He prefers that preceptors should be graduates of colleges, or if not, men who have kept pace with the nomenclature and scientific attainments of the profession.

It should be the conscionable duty of the preceptor, however active may be his practice, at reasonable times, to direct that student's mind in the channels where so soon he will flounder in his junior year unless that direction is given.

Sorry is the plight of the average student who enters college fresh from some office where his duties have been those of an office boy; whose habits have been anything but studious; whose mind is untutored, to be suddenly confronted by a professor who plunges into a scientific lecture, the terminology of which is Greek to him; and after the learned man has folded his manuscript and silently stolen away, the student begins to wonder what it was all about.

The student should be a ward of his preceptor while under his jurisdiction. The preceptor should be conscious of his obligations to that student, and failing to fulfill those obligations he has failed in his duty.

Were this standard of relation between preceptor and student more general, the preceptor would be more cautious about selecting his students, and a better class of men would be sent to our colleges from offices. Better by far dispose of them as summarily as did a dentist of this society when applied to by a young man to enter his office as a student. The doctor knew the young man's capabilities, and in answer to his request said, "Young man, for obvious reasons, I would advise you not to study dentistry. In the second place, if you will study dentistry I cannot take you as a student, for the reason that I have neither the time nor inclination to give you that attention a student should have in an office."

He was honest with that young man. He did not avail himself of the opportunity to make of that applicant one of those students—so-called—who keeps the office clean, polishes plates, and gets an occasional glimpse into a patient's mouth while running the engine or malleting a piece of gold. The student of law, the student of medicine, become familiar in the office with the nomenclature, the rudimentary principles, the elementary methods of their respective professions, and upon entering college are intellectually capable, by virtue of previous study and direction, to understand the lectures at the beginning. It should be so with the dental student.

These dental students finally come to the threshold of the college course. Here the mercury of their ambition and enthusiasm is suddenly chilled. Among the list of requirements they find that unless they possess a diploma from some literary institution or a literary degree, they will be compelled to pass an examination to give evidence of their fitness to study scientific subjects. Amid the student's consternation, knowing full well his inability to pass any literary examination of any gravity,—the character of which, by the way, has been largely exaggerated in the announcements,—he resolves to try it at any cost, and with fear and trembling faces the examining committee.

The mercury of his hopes begins to rise when the first question, "What is a noun?" has been propounded, and after several interrogations, such as "What is a hundredweight?" and "Name the cabinet officers of the present administration," the suspicion that the preliminary examination is a farce soon becomes a conviction, and he enters upon his scientific course having satisfied the examining committee of his fitness to pursue the same.

While this representation may be slightly exaggerated, in the main it is, with but few exceptions, nearer the truth than the ridiculous.

That this condition should not exist is a self-evident proposition.

The commercial idea, which seemingly dominates so many of our colleges, is largely responsible for this state of affairs. Students must be had at any cost, and therefore the latch-string is always left out, despite disqualification.

We believe the student should be required to prepare himself for entrance to a dental college at least as well as he should to enter the high school, but, as Dr. Black says, "Such will not be the case so long as the qualifications of the pupil, both for entrance and exit, are controlled by that circular god with the eagle stamped on the reverse side."

I have heard authoritatively that when the National Association of Dental Faculties concluded to raise the standard of requirements for entrance and graduation, a certain dean, in consultation with the members of the faculty of his college, vigorously opposed the same, upon the grounds that if their standard remained unchanged it would prove an attraction to students who desired to get through easily.

There are many earnest men in the dental profession, and to them we look for a material change of this condition. Already the National Association of Dental Faculties have indicated their intention in this direction, by elevating the standard of requirements both for entrance and graduation. And we sincerely trust that the letter of the law will be carried out. The gates that lead to our profession should be as zealously guarded as the doors that lead from it.

The writer will venture to offer a method, the details of which can be worked out, which, in his opinion, would go a great way toward mitigating some of the evils just referred to.

1. No person should be eligible to the candidacy of studentship until he has passed an examination before an examining board, which had been authorized by the State Board or the American Dental Association to determine his fitness for the same.

2. This examination should refer only to the literary qualifications of the applicant.

3. The examination should be commensurate with the subjects the student is expected to study.

4. A certificate from the examining committee, together with the additional requirement that not less than one year shall have been spent in an office, should give *entrée* to any dental college without further requirement.

This to a degree would not only change the character of the usual class of applicants, but would prevent the application of those totally unworthy to enter any profession by virtue of the fact that their literary education had been neglected.

Gentlemen, you may say that I am taking high moral ground, and that one can make a good dentist without such previous preparation, etc.; but when we consider that there are thirty-three colleges in active operation, and that nine hundred and sixty-three graduates were turned out upon an unsuspecting public last year, and that these colleges and students were much of the character herein described, it is time to consider the feasibility of elevating the standard. Further, you know as well as I that every earnest dentist is constantly fighting for the profession's recognition in the eyes of other professions and the general public.

Comparatively few of the public understand the real worth of the profession as represented by some of our progressive men. Porter, the census enumerator, presumably an intelligent man, one who should be conversant with the strides any vocation has made which lays claim to a professional standing, classes us as mechanics. One of our dailies of this city recently wrote a lengthy editorial questioning the claims of the dental profession to be called a profession at all, and if it could be proven to be a profession it was at the bottom of the ladder. The motive which actuated such an article I might divine, but it is not my business to impute motives. The article was read by thousands, and had its influence according to what knowledge of our profession the individual had.

Gentlemen, who is responsible for these positive impressions? Do we impress our patients at our chairs and in their drawing-rooms with the idea that the one only subject with which we seem familiar is dentistry,—a species of mechanics as they consider it? Professiona gentlemen are supposed to be cultured. Are we, as a class, so considered? If not, don't you think if a better educated class of men would enter the profession it would go a long way toward dispelling such impressions?

As was well said recently by a dental educator of this city, "A nation is judged not by the great men it has produced, but rather by the general intelligence of that nation." In proportion to its general intellectuality, will it rank with intelligent nations. So it is with a profession. Its general intelligence determines its rank. My theory for the partial solution of this problem may be criticised as being too idealistic, but the dental more than any other profession is in need of intelligent men within its ranks.

Recurring again to the student, who has now passed his preliminary examination, he assiduously applies himself with varying success to the prescribed course of study. At the expiration of the course, he presents himself for final examination, and in all probability passes.

After equipping himself with an outfit and location, he awaits the coming of his first patient, meanwhile taking an inventory of his stock of capabilities. He finds as a rule that in consequence of the large number of students, or of too few demonstrators, his course in mechanical dentistry has been deficient, and he feels his inadequacy in this branch more keenly than in any other. I do not mean to say that our colleges neglect this department, but, whether from preferment or the inequity of the college course, the student without office training invariably complains of his inefficiency in mechanical dentistry.

The infirmary furnishing as it does a foresight of the perspective of the operative side of his profession, the student willingly leaves behind the drudgery and dirt of the laboratory,—though equally essential,—and in consequence his education becomes, to a degree, unequal and one-sided. The three-years' course will do much toward relieving this condition.

This product of the college may, perchance, stop in the busy center in which his *alma mater* is located, and during the period of "longing and waiting" he recalls the many patients that were always at his disposal at the infirmary. So different from his present condition! Running his eyes down the advertising columns of the daily papers, he is confronted with the numerous seductive advertisements of the various colleges of the city, together with the flattering inducements offered by the local quacks. He needs a practice. He has been spending money for two years to attain a professional training, that profession is his capital stock, and he wants some return. He has been told that these quacks coin money. His ethical professor has told him that the one hideous violation of the code of ethics is flagrant advertising; yet the mother who gave him professional birth flagrantly violates the code upon the issue of every daily paper. He knows the infirmaries are crowded, while he sadly contemplates an empty office.

If he be an earnest man, and loves his profession, he will "make haste slowly," though forced to the conclusion that the college infirmaries and quacks are his bitterest foes.

That there is a manifest injustice in the manner in which the infirmaries of our dental colleges are run, I need not tell you. The impression that obtains after visiting a number of them is that they are run for revenue only. The writer is cognizant of the fact that one of the essential elements to the success of a dental college is that it should be self-sustaining, and would be chary in criticising any means that was justly calculated to accomplish that end. But, as a rule, the methods employed are pregnant with injustice to its newly-made graduates. Its ethical practice being diametrically opposed to its ethical theory, it follows as a consequence that the methods, of a necessity, must be vulnerable. In the opinion of the writer, any patron of an infirmary, whether medical or dental, should be looked upon as a charity patient. Being in indigent circumstances, they are unable to pay the practitioner's fee, and they therefore seek relief from the infirmary's corps. In the dental infirmaries, where a charge for material is involved, the cost to the patient should be so reduced as to come within his reach—thereby offering inducement to patient and opportunity to student.

We further believe that the persons presenting themselves to the dental infirmary authorities for treatment should either have a certificate from a reputable dentist stating that the holder was unable to pay for dental services, or give satisfactory evidence to that effect.

In every large city where there is a dental college, thousands are treated who are amply able to pay a respectable fee for efficient service. They belong usually to the class who go "shopping" for teeth; but were they made to understand that they were *charity* patients, we think their pride—so-called—would stop them short of a charitable institution.

It seems somewhat incongruous, to say the least, for an individual to feel able to shoulder the financial obligations incident to so swell an affair as a "charity ball," and then on the morrow apply to a charitable institution for treatment. Yet the writer knows of two who did, for the nonce, sink their pride to save their pocket-books, and harmonized satisfactorily—to themselves at least—those two extremes.

If I am to speak upon the authority of others, I am assured that the infirmaries of other cities are governed very much after the manner of Chicago institutions. And as every Chicago dentist is familiar with the methods employed by Chicago dental infirmaries, that knowledge is complete. It is only for the purpose of beginning "charity at home" that this portion of the paper assumes a local coloring. It is not the purpose of the writer to particularize any one college, and he desires to be understood as speaking of dental college infirmaries in general and of no one in particular.

These institutions essay to work for the "worthy poor"; consideration,—"only a small charge being made for material." This is untrue! We know it, and they know it. The patient is treated at these infirmaries without any effort, on the part of the college authorities, to find out whether he is rich or poor. Whoever presents himself for treatment can get the same,—provided he has the money to pay for it. "Only a small charge for material!" What a ruse! What a farce! There are many good dentists in this city who are *glad* to obtain the same prices.

This is an age of trusts, combines, and monopolies. Wherever they exist their methods are unjust, and their grinding greed, blunting as it does all sense of justice and right, makes the oppressed cry out that justice may obtain. These infirmaries are but small monopolies for the benefit of a few, governed by the most approved monopolistic methods. The mutterings and grumbling of the profession are but the manifestations of displeasure at this injustice. What are some of the results of this injustice? Men whose principal ambition of life is to get a dollar without much regard as to how they get it, have been quick to see how beautifully this infirmary scheme can be worked, and the consequence has been that innumerable colleges, so-called, with the infirmary attachment have sprung up in our midst. They received their incentive from our recognized colleges, some, no doubt, imbibing while yet sucklings the milk of quackery from their professional mother's breast.

Again, it is a positive fact that the worthy poor of this city have no place to which they may apply for the proper treatment of their teeth. An honest laboring man with a wife and three children, getting but a dollar and a half or two dollars per day, actually has no place to turn for the proper consideration of his family's teeth. The colleges charge him too much, and the dentist can't afford to give his time. The consequence is the colossal sacrifice of teeth that might be saved had we a truly charitable dental institution in this city.

If, as they advertise, our recognized colleges made but a small charge for material, what a boon it would be to the poor! For twenty-five cents and less, how many teeth could be saved to them that are now ruthlessly sacrificed!

Gentlemen, am I bearing too hard? Yet these are my honest convictions; why should I not speak them? Surely I need not gag my conscience at the court of diplomacy. The facts remain, even though they may not have been given public utterance heretofore. Is it not possible that we have become so afflicted with strabismus of conscience that when we look at wrong, we take it for right; or have we sunken into a condition of lethargy while the weeds of injustice threaten the fertile garden of our profession?

We heartily applaud the commendable work recently accomplished by the National Association of Dental Faculties, in extending the course of study in dental colleges to a three-years' graded course. We trust that this will be followed by an earnest effort on the part of the State Boards of Examiners to see that the law, in all cases, is complied with. It is an easy matter of form for any dental college to subscribe to this law, and still violate the very principles for which it was created.

The State Board of Examiners has the power, as the writer understands it, to *enforce* the law. Unless its enforcement is insisted upon, the law becomes as a piece upon the chess-board, shifted to suit the pleasure of the players. We sincerely trust that this good act will be supplemented by the better one which will require all graduates of dental colleges to be examined before a state board before they can have legal license to practice the profession.

I approach the next phase of my subject matter with considerable trepidation. In attacking that condition of a class of men, which for lack of a better term we may call self-satisfaction, you deliberately invite a splenetic outpour upon your audacious head. The writer, however, claims the amenities of this society for this evening, at least, from the fact that he is your essay guest and demands all the courtesies pertaining thereto.

Unless specialists beware of the limitations which a definite and absorbing pursuit imposes upon a man, and use their whole will-power in compelling each day to bring with it an hour or two of general reading in order to compel the soul to move across life broadly, in fullness, and not in the lines of a single sentiment or pursuit, they become narrow or illiberal. We are specialists. Do we employ these avenues to expand rather than contract our horizon? In this implied compliment we are not unlike the specialists of other professions, the only point of difference being that the successful specialists of other professions thoroughly encompass and familiarize themselves with the field from which they choose their life-work. As our profession broadens, and distinct pursuits are more clearly defined, we may some day act in a similar manner. But this paper is dealing with the profession as it finds it.

That we as a class are so afflicted I believe to be the result of several causes.

1. As I have indicated, we are specialists.
2. The intense practicalness of the profession.
3. The lack of a greater number of intelligent men in our profession.

The specialty of dentistry is broad or narrow in proportion to the knowledge of the art acquired. As some one has said, "In so far as its aims are benevolent and beneficent, and its culture broad, liberal, and scientific, it is a profession. In so far as it deals with practical and mechanical operations, with training of the hand to execute, and in much of the daily routine of the office, it is an art or trade. It approximates one or the other in proportion as it meets these tests."

As a profession we do not take rank as investigators. To how many of us have been given the keys to the doors of investigation, beyond which lay virgin treasures, waiting to render up their hiding-place to the zealous seeker? Few have passed these precious portals and returned with golden treasures, but the great mass are content with what is, and soon refine what is, to what is most conveniently suited to our methods, and we become patrons of ruts, mere machines. You know that

"The mouse that always trusts to one poor hole,
Can never be a mouse of any soul."

Some man has said, "Dentists are biggest when first hatched," and he evidently knew what he was talking about.

The bulk of the scientific data upon which our profession rests comes not from our own seeking, but is the result of investigations made by medical men. The lack of the profession's spirit of investigation is clearly mirrored in the literature of our dental journals. Run your eye through the list of subjects treated. It is a perennial iteration and reiteration of the same old subjects, told in the same old way, with an occasional deviation of sufficient warrant to justify the reader in renewing his annual subscription. How many articles begin with the time-honored phrase, "In casting about for a subject," etc. What is the use of that man writing an article for publication, supposedly for the edification of his readers, unless he has well-defined thoughts upon the subject that would justify the publication of the same? Again, our text-books are poor, inaccurate, and cumbersome. Few contributions are being made to this much-needed medium of education. And still the fact is that no profession holds out such remuneration to the observer, investigator, and recorder as the dental profession. It is young, and has the natural heritage of an age resplendent with scientific plumage amid a civilization never before equaled. Why should we lag?

I said another cause was our intense practicalness. Far be it from my intention to say aught against that which has been wrung from the grasp of science, the application of which has proven so great a boon to the profession. Such is not the spirit of my complaint against the intense practicalness of the profession. The man who decries every new theory that is advanced, who arrays himself against the progression of scientific attainment, who ignores the abstract and demands the more practical,—he is the man at whom my shaft is aimed.

Gross materialism is the spirit of the age; and the profession is full of materialists. Gross materialism is debasing in that it pollutes the attainments of science, converting the results of investigation to the art of mere money-getting. It stifles the vigorous enthusiasm of youth. It dwarfs the budding intelligence that fain would blossom into a broadened culture, leaving instead but an aftermath of weeds. It blunts the mind that would direct the skillful hand, and leaves a mere mediocre. It obstructs the growth—the very life of the profession, retarding its onward march to the high plane to which it is destined. This religion—money-getting—which seems indigenous to Americans, is one of the evils that has crept into our profession and threatens to storm the very strongholds to which we formerly looked for aid in our attempt to reach the goal of an undisputed position.

Lastly, the profession suffers for the want of a *greater* number of intelligent men. The students who win from literary colleges the degrees B.A., M.A., LL.D., etc., do not, as a usual thing, select dentistry as a vocation. Medicine, law, and the ministry seem to prove more attractive fields. The idea obtains that dentistry is a mechanical art, and they prefer a profession which, they think, deals more generously with material calculated to broaden their culture and deepen their intellects.

This large class of men, whose minds are trained to study, whose tastes have been directed, is a class which would be helpful, but which, as a rule, is lost to us. This is a misfortune, and the loss from this source is incomparable. The ranks of the profession are, consequently, filled with men whose mental training has, as a rule, been more or less indifferent, whose inclination is to drop the abstract and patronize only the practical side as soon as they leave the college doors.

Gentlemen, you have patiently listened to my "tale of woe." If some or all of my strictures have been too severe, it is not because I love the dentist less, but because I love the profession more. I have picked out the black spots upon the white silken garment. Of the good that has been done by the colleges, of the work of earnest men to elevate the standard, of the unparalleled progress of the profession, I have been silent. Of these possibilities I have left you to divine. I have simply hewn closely to the principle that if one does his duty he needs no praise. If he errs, he should be told of it. Duty should be the monitor of his actions, and if he does the right he but does his duty.

ADENOID GROWTHS, MOUTH-BREATHING, AND THUMB-SUCKING IN THEIR RELATION TO DEFORMITIES OF THE JAWS AND IRREGULAR TEETH.

BY NORMAN W. KINGSLEY, D.D.S., NEW YORK, N. Y.

(Continued from page 22.)

THE following described case is that of a boy between thirteen and fourteen years of age. The arrangement of the teeth in the upper jaw is shown in Fig. 8, that of the lower jaw in Fig. 9, and the articulation of both in Fig. 10.

In the upper jaw one of the cuspids is fully developed, while the other is just emerging from the gum.

The alveolar arch, as related to the size of the teeth, is narrow; not narrow positively, because in a smaller face and with smaller teeth the width of this one would not be abnormal. The width of the lower jaw corresponds with the upper one, and for masticating purposes the

FIG. 8.

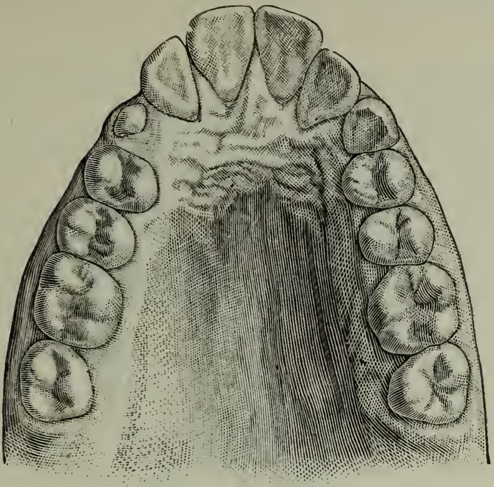


FIG. 9.

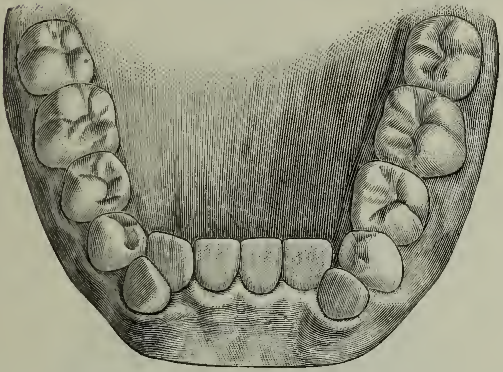
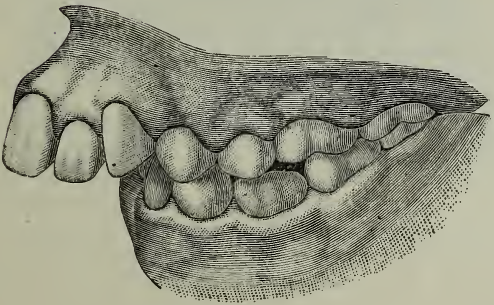


FIG. 10.



articulation is good and sufficient, but the four lower incisors have grown upward until they are half the length of their crowns above the adjoining teeth, as well as that much above the line of a regular arch.

When the lad came under my care, the face of the superior central incisors at their cutting-edges was in advance of the inferior ones exactly three-fourths of an inch when the jaws were closed, and the expression of the mouth externally was as seen in Fig. 11, this being made from a cast of the face taken at the time.

The boy's history, as learned from the mother, shows several interesting associated particulars. He is, and was from infancy, a mouth-breather, but his father also is, and has been, a mouth-breather; and the father has good teeth, well arranged, and no suggestion of malformation; neither is there any tendency to deformity of the jaws or irregularity of teeth in the mother.

An examination shows an adenoid hypertrophy at the left side on the wall of the pharynx. How long this condition has existed is unknown, as it was only recently discovered.

There is also hypertrophy of the mucous membrane lining the nasal passage on the same side. A chronic tonsillitis is also observable; in fact, there is a distinct tendency toward hypertrophy of the mucous tissue, for during the regulation of the teeth great obstacles were presented by the fact that the least irritation, as by a ligature or a clasp, caused excessive hypertrophy of the gum-tissue in the neighborhood.

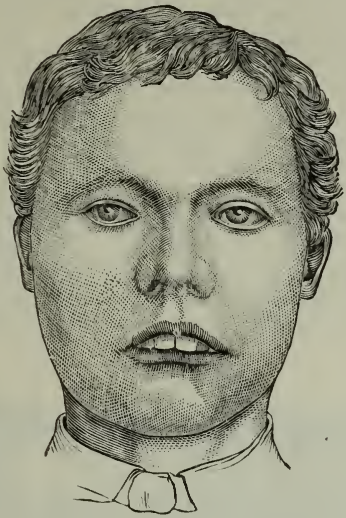
Until the boy was six years of age he sucked his thumb, but his method of placing his thumb in his mouth was peculiar. Instead of putting the ball of the thumb upward against the roof of the mouth, he hooked his thumb over the lower jaw with the knuckle up, and brought his hand around under the chin, thus holding his chin in his hand with his thumb in his mouth. His mother says she broke him of this habit at six years of age. The teeth, as shown in Fig. 11, are conspicuous, it being nearly impossible for him to close his lips; but this inability to close his lips could not be due entirely to the projecting incisors; it must have come partly from a short upper lip, this peculiarity appearing in all his photographs. One taken at the age of six months shows that the upper lip is so short that the upper gums are seen, though the mouth is at rest. Others taken at the ages of two, three, five, and six years show a short upper lip, and the teeth are seen. Another one, taken at eight years of age, shows the permanent incisors in place without protrusion; but one taken two years later, at ten years of age, shows perceptible protrusion, and the model exhibited (Fig. 11) shows the condition at thirteen.

The thumb-sucking habit appears to have been broken up before the eruption of the superior incisors.

The plan which I formed to correct this deformity was the result partly of my own judgment, and partly to humor the strong desire of the mother that it should be done, if possible, without extracting any teeth. With that view I decided to attempt to accomplish it by widening the jaw, retreating somewhat the upper incisors, and complete it by "jumping the bite."

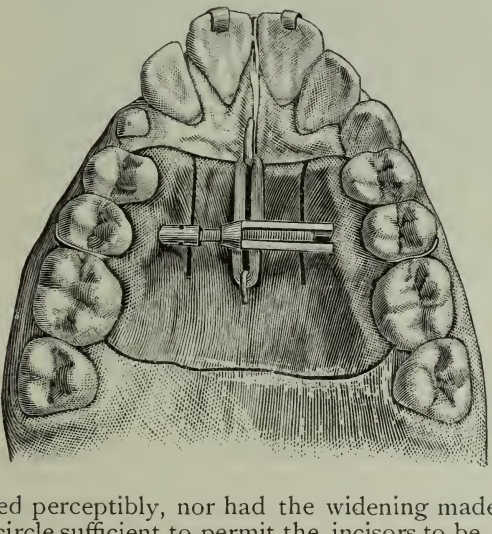
The apparatus for that purpose is shown in Fig. 12, and consists of a vulcanite plate and jack-screw for widening the arch, and, acting simultaneously with it, a T bearing on the face of the central incisors and connected by a rubber strap to a hook in the central part of the plate, as seen in Fig. 12.

FIG. 11.



The jack-screw was tightened daily for a couple of weeks, and the jaw widened about half the diameter of a bicuspid, but the incisors had not moved perceptibly, nor had the widening made an enlargement of the circle sufficient to permit the incisors to be carried back.

FIG. 12.



I then realized more fully than I had before, first, the necessity for the removal of one tooth upon each side of the upper jaw ; second, the exceedingly short upper lip ; and third, that if the incisors were moved back in the usual way they would become elongated.

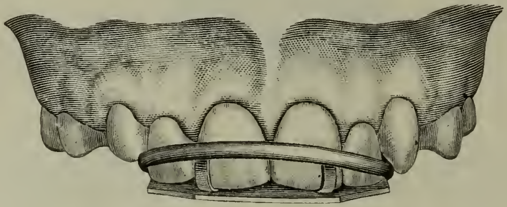
An experiment was made with a plaster model of the jaw, to determine approximately what that elongation would probably be.

The incisors were cut out of the model with roots, and reset on the model, keeping the extreme ends of the roots to their original position and moving the crowns to the place desired.

This experiment showed that in dropping the teeth 'from the angle occupied in the jaw to a perpendicular position, they would appear to be nearly half the length of their crowns longer than before. Taking the boy's short upper lip into consideration, such an elongation would have created a deformity worse than the first.

The first step in the second stage of treatment was the removal of the first bicuspid upon each side, and a plate was made of silver covering the roof of the mouth and the teeth. This was made of silver in preference to vulcanite because I wanted as little thickness as possible over the molars and bicuspids, and that thickness to be uniform, so that the interference with the lower teeth in mastication caused by widening the upper jaw might have a tendency to widen the lower one to the same extent. This plate was retained in position by narrow clasps around the molars, and, when fitted, a bite was taken upon it in wax to show the position of the lower incisors.

Fig. 13.



The plate was then extended horizontally like a flange or apron in front of the lower incisors, on a level with and resting upon the cutting-edges of the upper incisors. This apron did not interfere with the lower incisors in masticating, as they closed behind it.

A stout band of gold was made to fit the face of the upper incisors, with a hook at each end, and hooks over the cutting-edges to keep it in position. The strain upon the teeth was made with rubber elastics reaching from the extremities of the bar backward, and caught on hooks near the posterior border of the silver plate. This apparatus is shown in Figs. 13 and 14. It needs no argument or description to show that while in use the incisors must be moved backward by the strain of the elastics, and that it was impossible for them to become elongated so long as the plate was kept in close contact with the molars and bicuspids, and this contact was secured by the clasps and by mastication upon it. This is exactly what it did accomplish. It was worn uninterruptedly except for cleansing, and was readily removable (almost too readily) by the patient. The only attention required at the office was to cut off the horizontal flange from time to time as the incisors were retreated.

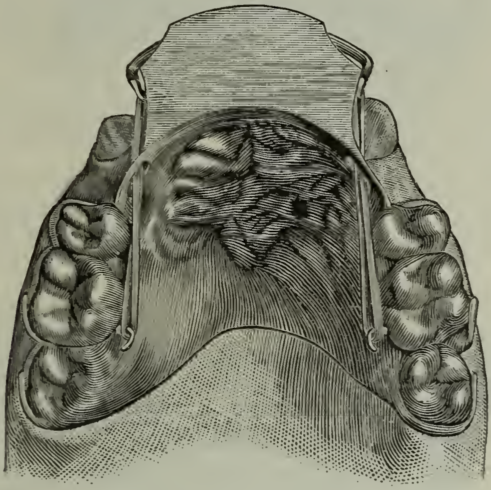
There was no guessing at the movement of the incisors ; cutting the flange even with their faces, the projection at the next visit would show the gain.

The plate represented in the drawing is the identical one which did the work, only that as the flange was cut off piecemeal during its use, a new one has taken its place for the purpose of this illustration.

The time required for the incisors to be moved backward into a perpendicular position was about two months, and, according to the experiment before described, they must have been driven up in their sockets nearly or quite half the length of their exposed crowns ; nevertheless, the crown-exposure below the gums did not appear to be lessened. In this description and in the illustration, it will be seen that this apparatus bore only on the incisors.

The undeveloped cuspid upon the right side of the mouth was left to the forces of eruption to bring it into the place of the extracted bicuspid, and it was calculated that the secondary pressure upon the left cuspid would drive that also, but it did not, and it was soon observed that the incisors were falling in behind it, giving it the appearance of being forced outward instead of backward. As soon as this was discovered, a band with a hook upon it was cemented to the cuspid, and an elastic strapped to a hook at the end of one of the clasps on the face of a molar, as seen in the illustration. This served to reduce it to the desired position as soon as the incisors had reached theirs. To retain these teeth in place, a vulcanite plate was made with a band of half-round gold wire in front of the incisors, as shown in Fig. 15, which also shows the circular form which the arch has assumed. The shortening of the arch from the center in front to the posterior border of the molars, measured as described before, is eighteen per cent. It is not likely that all this shortening of that line is due to the retreating of the incisors ; it is probable that the molars and bicuspids yielded somewhat to the strain, and moved toward the front ; nevertheless, a comparison of the articulated models before and

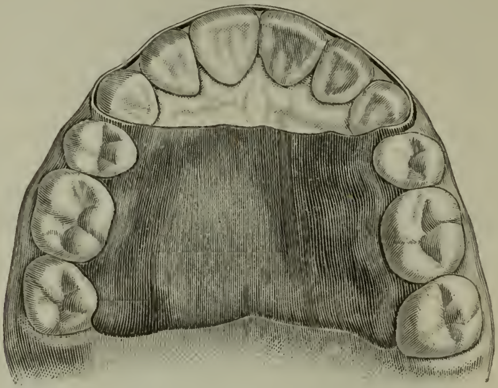
FIG. 14.



after fails to detect it, but this can be accounted for by the supposition that the lower jaw moved forward and accommodated itself to the upper one.

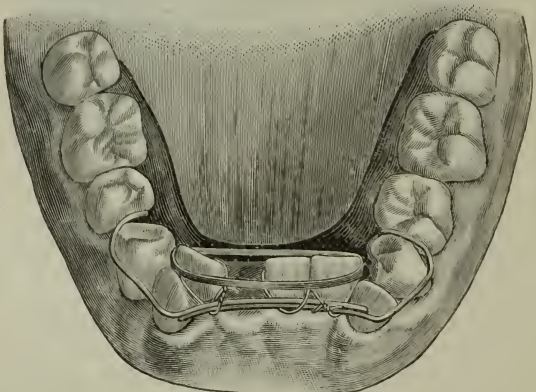
It was not until the regulation of the upper jaw was completed that any attention was given to the lower one. While in many cases regulation of upper and lower teeth can be carried on simultaneously, in this case nothing could be done with the lower jaw without interfering with the apparatus on the upper one.

FIG. 15.



The lower incisors, as will be seen by reference to Fig. 9, are elongated and crowded between the cuspids, or, as some might say, the cuspids were crowded out of place; and in fact, in some other case exactly like it,—without considering the relation to the upper jaw,—I should have so decided, and would have expanded the arch so as to have brought them all into line; but the upper arch had now been reduced so much in size by the extraction of the bicuspids and the retreated incisors, that some tooth in the lower jaw must be sacrificed.

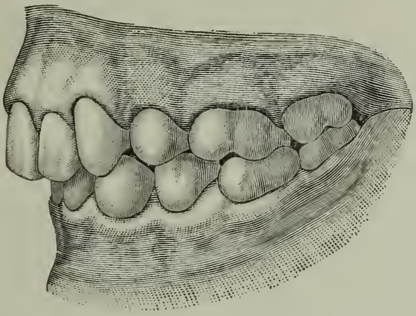
FIG. 16.



The simplest and best way which I have advocated for many years in similar cases is the removal of one of the incisors, particularly when the occlusion of the teeth behind the cuspids is fairly good.

In this case, as in most others, where one is to be extracted, I have chosen a central, the reason being that the inclination of the remaining teeth will appear better than when one of the laterals is extracted, and the three teeth remaining all lean that way in closing up the gap. One of these centrals was removed, and an appliance as shown in Fig. 16 was adjusted. It was a vulcanite plate with piano wires, one from each side, meeting and lapping in front, and in their relaxed position standing off for an eighth of an inch from the face of the teeth, but were sprung in and tied to the incisors with waxed ligatures. This vulcanite plate was made pretty stout, comparatively non-elastic, and impinged upon the lingual walls of the bicuspids and molars, for the purpose of assisting nature, which was widening the arch by occlusion with the upper one, and, as from time to time it loosened by those teeth yielding, the plate was warmed and readjusted. A small ring from rubber tubing was also stretched over the three teeth, to assist in closing the gap.

FIG. 17.



In four weeks the space was closed, and an expert could not, with certainty, tell which tooth had been removed. The retaining fixture was exactly like the regulating plate without the piano-wire attachments. The final condition is shown in Fig. 17. The most singular result of the rearrangement of the lower incisors, and one for which at present I do not attempt to account, is that these teeth have gone down into their sockets not less than a quarter the length of their crowns; they are no longer higher than the natural plane of the lower arch.

I say that these teeth appear to have been driven into their sockets, but no apparatus worn on either the upper or lower jaw could have had such a tendency; on the contrary, the strain upon them in moving forward would have been more likely to have elongated them than to have shortened them. If we cannot accept the idea that they sunk in their sockets, we are forced to the only other alternative, that all the other teeth, cuspids, bicuspids, and molars, simultaneously and uniformly rose from their sockets, for certainly now the plane is not abnormal.

(To be continued.)

DENTIST, DOCTOR, TEACHER.

BY B. S. SCOTT, D.D.S., ELLENSBURGH, WASHINGTON.

(Read before the Tacoma Dental Society, Washington.)

To be a conscientious, consistent dentist is to be a doctor; to be a doctor is to be a teacher; hence the implied significance of the term doctor as applied to the members of the dental profession.

Dentist, doctor, teacher: these are or should be synonyms for the highest attainments in a calling which, as a specialty of the medical profession, has for its object the alleviation of some of the physical ills of mankind.

No profession to-day requires a broader or more versatile education for its properly successful practice than that of dentistry; no vocation more constant, persistent, and unremitting effort. That the dentist may attain eminence among his fellow-workers, it is desirable that he should possess familiarity with a diversity of acquirements, and it is unavoidable and indispensable that he have excellence in many.

The progressive dentist of this period is compelled to be a courteous gentleman at all times, a mechanic, an inventor and experimenter, an investigator, a student and logician, a close observer of current social and political conditions, sympathetic, honest, charitable, firm, patient and persevering in the performance of his work, as well in his treatment of the various phases of human nature with which he is confronted, as in the application of mechanical and physical principles.

To map out all the attributes of a model professional dentist would take more time and more ability than it is the fortune of your essayist to possess. There is, however, one attribute that should belong to the dentist, which in his relation to the masses seems to me to be of paramount importance, and that is his province as doctor or teacher.

Dr. J. A. Osmun, of New Jersey, thus concisely states the subject: "How to reach the masses, how to elevate them to a proper appreciation of the efforts put forth by the dental profession for the correction of evils resulting from perverted nature, and their own carelessness concerning dental subjects, is a question worthy of our consideration." It is this essential quality which it is the object of this paper to stimulate to greater perfection and usefulness, if possible.

Popular education was coexistent with the birth of the republic, and has been one of its fundamental principles, until to-day the majority of the citizens of the Union possess a knowledge of the more common branches of learning, and the time is ripe for the intelligent explanation of some of the specialties.

Education is defined by Webster as "the bringing up, as of a child;" or, "Education comprehends all that series of instruction which is intended to enlighten the understanding, correct the temper, and form the habits of youth, and fit them for usefulness in their future station." Teacher is designated as "one who teaches or instructs," or "one whose occupation is to educate others." A careful condensing of the subject of education, according to a well-known authority, resolves itself into "the formation of a habit." Therefore, concisely but broadly stated, the teacher instructs or educates the ignorant, young and old, in the formation of habits.

The first necessity in the formation of a habit is the desire on the part of the recipient for the requisite knowledge to form this habit, and without this wish, progress is very slow, if not impossible.

The first requisite in a successful teacher is the ability to stimulate in his pupils a desire for knowledge ; after that, to be able to impart such knowledge in a clear, forcible, and impressive manner. Without these qualities his efforts will be largely hampered, if not practically useless.

Primitive man was taught to make use of architecture by the desire for protection from the inclemencies of the weather, until the architect formed the habit of designing and the artisan formed the habit of perfecting his plans. In modern times, through the same process, we have learned the art of telegraphy because of the desire for rapid communication, and have formed the habit of harnessing the forces of steam from a desire for quicker transportation. Thus man's entire education has been developed through a desire for knowledge, when a habit has been engrafted, whether for good or evil.

How shall an education be obtained or the habit be formed?

It has been well said by undoubted authority that the education of the masses is the basis of common prosperity ; and by the same author that education is obtained from many sources, but first of all from home influence. Thus the public schools furnish instruction in the elementary branches ; the academies and colleges in the higher paths, the church in spiritual affairs, society in social matters, the medical and dental colleges in general medicine and in matters pertaining to the dental organs, and so on through the various phases of advancement of the human mind. Each of these departments of learning has its masters, who have by special preparation fitted themselves to impart instruction in their particular themes. Thus the schools have their principals and assistants, the colleges their professors and tutors, the church its ministers and priests, medicine and dentistry their practitioners and teachers. But however able these teachers may be in their several departments, their success is more dependent on the habits of their pupils of acquiring and retaining knowledge that have been formed by home influences than on any other means.

Having thus briefly outlined the subject of education in the abstract, we will be better fitted to consider its dental aspect.

Fifty years ago, thorough, comprehensive, systematic education of the dentist was but little thought of, the schools of dentistry were embryonic, the dental society was but a theory, and dental literature was meagre and crude. To-day the dentist has the aid of a regular, methodical course of study, mapped out and determined from the experience and thought of the leading members of the profession ; the dental society is more and more becoming a factor in the general teaching of the profession, and the literature upon dental subjects is comprehensive and clear. In future the efforts for improvement must be directed largely to the education of the masses, in order that the educational aspect of the profession may keep pace with its material and manipulative advancement.

With the hope of presenting the subject of the dentist as an educator more logically, I have endeavored to classify it under six heads, viz : 1, Where ; 2, When ; 3, How ; 4, Why ; 5, Obstacles ; 6, Results.

(1) Where shall popular instruction on dental subjects be attempted?

In the order of effectiveness we may name the following places where it may be brought about through the influence of the dentist, commencing with the least important:

In the dental publications, in which to-day an absence of the subject is conspicuous, because through dental literature the best plans and methods may be laid before the practitioner whereby he may reach the public as an individual.

In the dental societies, because by an interchange of ideas the same results may be obtained.

In the dental colleges, because the training of the youth of the profession should there be performed and their duties as teachers be systematically designated.

In the public schools, because it is there that instruction of the young is effected in a simple way and by the most approved methods.

Lastly, and most important, in the home, because by home influences habits are formed for or against the future welfare of the child and that of the masses through the children; and also for the reason that the mind of the child, when it receives its first impressions, is in its most plastic state, ready to be molded to any habit or idea.

(2) When shall this subject be taught?

As related to time, in youth, which is the most effective period of life, on the principle that it is hard to "teach an old dog new tricks," to turn a well-rooted train of thought, or break off an established habit. "As the twig is bent the tree's inclined," is as applicable to this subject as to any other. As related to opportunity, on every laudable occasion which includes the desire on the part of the recipient for the information, whether such desire be real or implied.

(3) How shall this subject be taught?

By the devotion of more space in the dental journals to the ideas of thoughtful men in this direction.

By careful discussion and meditation in the society meetings of every aspect of this division of popular education, and by permitting the motive of it to pervade and influence all the workings of the society.

By diligent individual application in the attainment of useful knowledge, in order to be able to dispose of it when occasion offers.

By instructing professional teachers in the general knowledge of prophylactic measures and professional expedients; in the care of the teeth, as well as in the anatomical, physiological, and pathological conditions most commonly the result of carelessness and neglect in the young; at the teachers' associations and in the normal schools throughout the Union, by public sentiment and desire if possible, and by recommendations to the proper authorities for legislation if necessary.

The incentive to many teachers to become such is the salary they hope to command, instead of a thorough comprehension of the importance and love of the work of training the mind. The motive, then, which actuates the teacher is therefore the measure of his fitness and ability, and his success or his failure; on this account, by impressing the instructor of the young with the importance of an understanding of this subject, the impression is transmitted in turn to the child who is his pupil.

By endeavoring to imprint upon the parent through personal contact, as he presents himself for operations upon his own mouth, the proper appreciation of the ways in which to avoid the ills to which he has been subjected ; striving to arouse his interest in every consistent way, that this influence may be felt in the home-circle, which the highest authority tells us is the best way of all in which to form the habits of the young.

By interesting the press, more particularly the weekly story-papers and the juvenile periodicals, in the publication of short, bright, and attractive articles on the care of the teeth and the objects of professional interference, as is done in matters pertaining to the care of the eye and ear.

By influencing the faculties of dental colleges to include in their curricula a series of lectures on the ways and methods best calculated to reach the public ear and stimulate the public desire.

By causing to be inserted in the current text-books on physiology well-written chapters on the teeth and their conditions, and the methods for their protection.

(4) Why shall we teach?

The noblest mission of man to humanity is the alleviation of suffering of any kind, whether physical or mental.

The first motive, then, that should induce to the pursuance of this theme is the improvement of the condition of our fellow-beings.

Up to this time we have dealt largely with abstract materials in their application to other material things, though recently a strain has pervaded the writings of our more thoughtful men indicative of an increasing realization of the fact that to produce the best possible results a proper knowledge and understanding must be found in the patient. To teach the people will do more to exterminate the "cheap John" and the "shop" than all the legislation for that purpose extant or projected.

With the introduction into the studies of the public schools of certain fundamental principles of dentistry, bringing into prominence the oral cavity as the beginning of the alimentary canal and its relation thereto, the pottery substitutes, now so common and so distasteful to the educated, conscientious dentist, would be less frequent. Proper instruction would supply knowledge of lasting benefit, the importance of which the public does not realize through almost total ignorance of the conditions and results which prevail in the mouth. Professor Miller has given a potent reason, in his recent paper on "The Human Mouth as a Focus of Infection," in which he has shown by means of tabulated proofs of undoubted authenticity that no fewer than thirty-eight different infections may be traced with more or less directness to the human mouth as the focal or initial point.

To disabuse the popular mind of the opinion that the highest qualification of a competent dentist is based on his ability to extract teeth in the most deft as well as painless manner, and thus raise the standard above that of the barber of bygone days.

From an economic standpoint, the proverbial saying "a stitch in time saves nine" is especially applicable to conditions of the dental organs. From a selfish standpoint, the reason why is that the public may know that as professional men we demand a fee for our knowledge and not for material as tradesmen. Also because the education of the masses in the elementary principles of our specialty will unmask the professional trickster and make for the dentist a place among scientific men, an object of respect and the representative of a liberal calling.

In the furtherance and spreading of information among the community there will be many and various obstacles, which will be interposed not only by the people themselves but by some of the profession. There will be the priggish and narrow-minded dentist, who will raise the cry of "unprofessional," whenever he sees an item in the press. There will be the unskillful and unscrupulous quack, who will use every effort not only to continue the present ignorance, but to plunge as far as he is able every consideration of the subject into deeper mystery, in the hope that the fallacy of his deceptive theories or of his special process may not be discovered by his unsuspecting victims. There will be many members of the profession who from motives of cupidity will often cause a cloud of obscurity to be thrown around dental operations by men who know better. There will be the drones who, by making no effort for, will materially retard success.

The work will be more or less impeded because all successful practitioners are not naturally teachers, and their effort will be to ridicule the whole idea.

A menacing obstacle will be the fact that the same forethought and provision is not applied to dental matters as to other affairs of everyday life. To satisfy the uninformed of the honesty of the dental fee will be no easy task, for no item of yearly expense is more grudgingly paid by them.

The fact that more useful artificial substitutes are constructed for the dental organs than for any other organ of the body will prove to be a great hindrance to the dissemination of general information related to our specialty.

By far the most serious obstruction to be encountered will be the apathy of the community, which will require all our courage and zealous effort to overcome and supplant by desire and interest.

What will be the result?

At present the ignorant dentist and the uninformed physician are permitted by the uneducated to ruthlessly sacrifice the dental organs, either for pecuniary motives or on account of their inability to make a more satisfactory termination of pathological conditions or through their ignorance of the causes of such lesions. As a result, the higher grades of dental operations are at once set down as dishonest by a large majority of the people.

The tales of the wily or unscrupulous practitioner are more readily credited than the intelligent reasoning of his more conscientious competitor. As a result, mankind in general is easily duped by a plausible story which they are unable to disprove, and the duplicity and want of skill of the quack are thus concealed.

Dentistry, and in fact all medical specialties, partake too much, even at this late day, of the mysteries and mummeries of the witchcraft or black art of the Dark Ages.

The members of these professions meet in societies, where, instead of referring the fee bill and like measures (ostensibly for common protection) to a committee, they tax time and brains alike with useless quibble and squabble, when the direction of the same amount of energy to the proper education of humanity at large would render the fee bill an almost unnecessary provision.

As a result of the proper teaching of our patrons, the value of the operations of each individual dentist would be as apparent as that of a pair of shoes or a spring bonnet.

The result of instruction will be to demonstrate that a clean mouth is as essential to health as a clean skin, that preventive and protective measures there are as important as the protection of any other part of the body, and that the care of the mouth is as much a duty as the purchase of food with which to fill it.

Domestic economy will result, in that early and regular attention to the condition of the teeth will reduce the annual necessary expense.

Finally, the proper effort on the part of the members of the dental profession, devoted to the bringing up of the rising generation to a full knowledge of their dental conditions, will result in more tractable patients, better dentists, and in the elevation of the professional standard.

The desirability of general instruction in dental subjects, both for the good of the people and the benefit of the dental profession, the necessity for concerted action by the doctors of dentistry throughout the Union to secure recognition of the importance of the subject by the authorities who have charge of the educational interests of the country, the necessity of thought and effort to stimulate a desire for this knowledge to furnish an attentive ear and an observant eye in the community, and the constant instruction of parents regarding the pressing need of early training at every opportunity, are all apparent to those who reason from cause to effect.

In conclusion, let us ever remember that the dentist is commonly called doctor, and if he is conscientious in endeavoring to lead not only his fellow-laborer but his fellow-man out of the darkness of ignorance into the light of a clear perception of "the efforts of the dental profession for the correction of evils," the term is just, as meaning teacher.

Just how deserving the average dentist of to-day is to the title of doctor may be left for individual consideration, with the hope that a study of the subject may have the effect of stimulating us all to greater exertion in this boundless and truly noble branch of a noble profession.

METHODS OF FILLING TEETH.*

BY RODRIGUES OTTOLENGUI, M.D.S., NEW YORK, N. Y.

(Continued from page 29.)

GOLD AS A FILLING-MATERIAL.

GOLD is pre-eminently the best material with which to fill teeth. It has the great disadvantage of being a good conductor of heat, and it unfortunately requires considerable time for its proper insertion, in addition to which it lacks some of the good qualities of other materials; but nevertheless it can be stated positively that the main reliance for the salvation of teeth which have decayed must be upon gold.

It then becomes of the gravest importance for a dentist to thoroughly understand this material and its manipulation, and after acquiring the requisite skill, to be conscientious in his application thereof.

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It is furnished to us mainly of two kinds, cohesive and non-cohesive, and in three forms, viz, foil, including cylinders and blocks, rolled or heavy foil, and the various kinds of plastic gold.

In using gold, the dividing line is where we decide to depend upon non-cohesive or cohesive gold. Non-cohesive gold was used by the earlier dentists exclusively, because the dependence upon the cohesive property of the metal is comparatively recent. Since the adoption of cohesive gold, the older methods have fallen into such disuse that it is safe to say that only a small percentage of dentists still follow them, while a very large proportion of the younger men have never even essayed them. The question then arises, "Is there any advantage in non-cohesive gold which is sufficiently important to make it deserve a place in office practice?" If there is, I am ignorant of it. In making this statement, I am aware that I will be criticised, but my position is just this: In my own experience I have never discovered any special use for non-cohesive gold. I have never been able to appreciate the advantage of having my gold so that the different particles would not cohere under pressure, nor have I been able to see the disadvantage of having them cohere. I have frequently met prominent men who have admitted using non-cohesive gold. I have invariably asked these men why they ever prefer it to cohesive gold, and the replies have always been either evasive or unsatisfactory. The best answer ever offered to me is that non-cohesive gold may be used where a cohesive gold filling would be an impossibility, as for example, in the buccal surface of a molar in the lower jaw, where the cavity extends so far below the gum-margin that the dam cannot be employed. It is claimed that a good gold filling can be made in such a situation if non-cohesive gold be used. I believe that this is possible, but I also believe that it is possible only in the hands of a limited few who have attained to extreme skill in the manipulation of the non-cohesive golds. I think that as a practice for the many a large percentage of failures would be the result, while the same men could produce admirable and sufficiently permanent results with other material than gold.

A use which I was taught to make of non-cohesive gold is to place it against the walls of cavities, finishing with cohesive foil; the idea being that non-cohesive gold can be better made to adapt itself to the walls, and that thus a more nearly water-tight filling will be produced. This I think must be condemned, especially where by so doing we would occupy, with non-cohesive gold, that part of the cavity upon whose shape we depend for the retention of the whole mass of the filling. While there will be some cohesion between the underlying layer and the superincumbent portion which is made with cohesive gold, I am certain that a stronger filling can be made where cohesive gold is used throughout. I have removed so many fillings, taking out first a solid piece, and then picking out the remainder in crumbs, that I believe the practice has been relied upon by many. My removal of such fillings has usually been because of discolored margins, showing where caries had crept in and was undermining the fillings.

My opinion, then, of non-cohesive gold is that in practice we have so little, if any, need for it, that the dentist may discard it almost *in toto*. In the colleges, however, its management should be taught, for the student who learns to fill with non-cohesive foil will have acquired a degree of manual dexterity which will quickly make him expert in the use of cohesive gold. Too many have neglected to learn in this way, and *the cohesiveness of gold has enabled many inexpert men to practice dentistry, palming off upon patients fillings which may look bright and smooth to the inexperienced eye, but which in a few months become rough, in which condition they are a menace to the safety of the teeth.*

Of the manipulation of cohesive gold much could be written. It is my purpose here only to point out the more important facts, and if possible to draw attention to a few points of faulty working, upon which I think many failures depend. I like to have all three kinds of cohesive gold in the office. A cavity may be filled with either, exclusively, and in many smaller cavities it is wise to do this. There are many other cases where the employment of two and sometimes of three kinds of gold is expedient.

Of the plastic golds, I have had the most experience with Watts's crystal. This is a form of gold much praised by many, and much condemned by others. Its strongest advocates undoubtedly use it too frequently, and place too much dependence upon it, while those who condemn it utterly are simply ignorant of its virtues. They have probably endeavored to use it as they do other plastics, forgetting that it is a metal. Its chief virtues are : first, its great cohesiveness, no gold being more so, if there be any that has as much ; second, the small amount of force necessary for condensing it ; and third, the fact that it will remain where it is placed, having no tendency to ball up, and roll about in a cavity.

Its first advantage, cohesiveness, makes it especially useful in many instances, of which I will enumerate a few. It has occurred to many that while inserting a large filling, leakage has made some portion of the surface of the partly-made filling non-cohesive. The effort to add another pellet of foil is vain. If the surface be touched with alcohol and then dried with hot air, crystal gold will adhere, *provided it is used in small pieces.* I have even removed the dam, where a large gold filling was but half finished, and continued the operation at a subsequent sitting, the gold meanwhile having been protected by gutta-percha, though of course this did not keep it dry. Such a procedure should not be adopted unless the remainder of the cavity still presents a retentive shape. Thus the adhesion of the crystal gold becomes more a matter of convenience than of necessity in such cases. Where a filling becomes wet before completion, it being in an exposed position, as the corner of a central incisor, if it be dried with alcohol and hot air, as before advised, and then a clean rose bur be used to freshen the whole surface of the metal, crystal gold may be made to unite firmly with it, and the filling may then be safely completed.

If, while filling, a bit of the edge of a cavity crumbles away by accident, or when finishing it is seen that there is a slight imperfection along the border, crystal gold is invaluable. The tiniest burs may be used to cut a groove or pit, and this may be more perfectly filled with crystal gold than any other, because of its cohesiveness, and more particularly because it can be torn into smaller bits without losing its pliability.

A third use is where a portion of a cavity which is very inaccessible requires the use of the mouth-mirror. Such a place might occur where, in an approximal cavity in an incisor, the palatal depredation has been great, and an examination of this palatal portion after the filling is nearly completed shows that it is not full enough. Crystal gold can be built on here more readily than any other.

The second good quality, its plasticity, makes crystal gold especially useful over nearly-approached pulps. It is frequently instructive for a dentist to have his own teeth filled. He then discovers, much to his surprise perhaps, that certain methods produce pain, which, as the dentist, he may have thought to be painless, or where patients have complained, he may have attributed the cause erroneously. I have myself been astonished to find that the mallet will cause excruciating pain over a particular spot; pain, too, of a character which showed that the pulp itself was disturbed. It is my opinion that where a pulp is nearly approached, that point of the dentine which is thinnest, becoming more resilient, yields slightly under the force of the mallet, thus producing pressure, which shocks the pulp. Therefore, when a patient complains of a distinct pain from the mallet at a specified point, and at that point only, or more than elsewhere, I now attribute the disturbance to the above-described cause, and continue the filling with crystal gold, using hand-pressure until, having built a sufficient thickness of metal over the thin portion of dentine, I find that the pulp no longer responds painfully to the mallet-stroke. For similar reasons small cavities may best be filled with crystal gold, using hand-pressure, whenever the tooth is sore from wedging. Still, except in the smallest cavities, I should prefer to make the extreme outer surface of heavy foil, as will be described.

Another most important usefulness of crystal gold is that its plasticity allows the operator to work with less danger of fracture along weak walls or in deep undercuts. A more resistant form of gold, acting as a wedge in such an undercut, may crack or even break the enamel. I have seen a whole corner forced off with a corkscrew plugger, which was being used to drive a pellet ahead of it. I think it could have been well filled and preserved by the use of crystal gold. This accident occurred at a clinic, and caused the operator much chagrin, but from an educational standpoint it furnished a better object-lesson than if it had not happened.

The third quality, that of not balling up, brings me to a description of the right and of the wrong way to use crystal gold. While it is true that it will not ball up if properly used, it is also true that it will so act in unskillful hands. The great danger with this material is the temptation to use too large pieces. The inexperienced may think that, being plastic, it may be crowded into a large cavity and then condensed afterward. I have seen this method advocated at a college clinic by one of the instructors. It is a mistake. In the majority of such cases, when the mass is condensed, it will be found that it can be moved to and fro within the cavity. *Whenever this occurs, with any kind of gold, the only correct procedure is to remove the whole and begin again.* To attempt to hold it in place, until wedged by what is placed above it, is to deceive one's self and defraud the patient. The mass may be thus fastened so that it will not move, but the space between it and the walls, *which must have existed since motion was possible*, will not have been eradicated. I cannot use language too positive in recommending small pieces of this or any other kind of gold. *I never place any bit of gold within a cavity which cannot pass the orifice* *without touching the edges.* I frequently use pieces even smaller than would be thus indicated. The rule is as binding with a plastic gold as with any other.

Another method of manipulation which I think is a grave error is to use a foot-plugger with crystal gold. A foot-plugger has a distinct usefulness, but it is an instrument which produces many poor fillings, simply because used in wrong places. I use small points for all kinds of gold, and equally so for crystal. Suppose that a mass of crystal gold be placed against the filling within the cavity, just as the gingival margin is to be covered. I should condense it with small points, thus uniting it perfectly with the gold already placed, and gradually approaching the borders. Then I should exchange for a foot-plugger, and go over the surface, flattening out hills, and especially perfecting the impaction against the border, finally chiseling off with this same plugger all the excess which projected beyond and over the edge. To sum up, then, I should depend upon crystal gold mainly for covering the walls of cavities, and for such other places as I have indicated. I should not use it much for contour work, or allow it to reach broad masticating surfaces. Care should be used to see that it is not partly condensed before it is inserted in the cavity. It should therefore never be held in the fingers. A good method is to make a gold wire loop, or staple, and with this pin the cake of gold to the wooden box in which it is sold. Small bits may be torn off with the foil-carrier as needed, without danger of compressing the mass.

Passing now to foil, I have to consider briefly the various forms in which it is supplied. In the first place, there is the condition of the surface. We find this either bright as though burnished, or rough, appearing as if "frosted." This style of gold has various names, depending upon the maker. I do not remember any special advantage that has been claimed for it, and it is probably manufactured to supply a demand created by a habit, rather than by reason. On the contrary, my own experience with it would condemn it. It is less cohesive than the plain, and this is seen to be natural upon a moment's consideration. The adherence of one thing to another may be produced at any time by effecting absolute contact. Glass, which we would not count as possessing the property of adhesiveness, will develop the property if two smooth pieces be wet and laid one upon the other. There is nothing sticky about the water, and its action is simply in completing the contact. Therefore *smooth* gold should be more cohesive than *rough*. I have been told that this frosted gold is more easily worked, that it is softer. That is admitting that it is less cohesive, since the words "soft" and "non-cohesive" have become synonymous when applied to gold. Moreover, this very softness is a disadvantage, since it renders the material crumbly, another property of non-cohesive gold fillings. If cohesive gold is to be used, it should be as cohesive as it can be obtained, and while it should be *pliable*, we need *toughness* in preference to *softness.*

Secondly, as to the form in which to use cohesive gold. Of course the packing of a continuous rope into a cavity is not to be thought of. An advantage with non-cohesive gold, it becomes a mistake with cohesive foil. The whole idea of such a procedure is to produce a filling made of as few pieces as possible. This is no longer needed when we can obtain a cohesion between the particles. It is therefore probable that the axiom should be reversed, so as to read, "Use as many pieces as possible" rather than "as few," as formerly. This, however, would be an extreme teaching, since it would mean the expenditure of too much time over an operation. It is, nevertheless, a sign-board pointing in the right direction.

We may obtain square blocks, and rolls cut into short lengths. To me, both of these are the lazy man's adoptions. He asks the manufacturer to do for him that which he should do for himself. As I do not like patent medicines, of which a stated dose will cure an unspecified individual, so neither do I fancy gold prepared to fit unseen cavities. How does it work? If we obtain an assortment, as we probably would, we begin instinctively by using up the smaller pieces. As we find the stock decreasing we are compelled to use larger and larger pieces, till at length we reach a condition where having a small cavity before us, and only large blocks in the gold drawer, we either improperly fill with too large pieces or else we stop to cut up the blocks, causing more or less compression, and generally poorly-shaped pellets.

I prefer, therefore, to procure gold foil in books, and roll and cut it for each case immediately before inserting it into the cavity. I have never found any way of keeping gold in the office, superior to leaving it between the paper leaves of the books. Foil in books may be obtained "trimmed" or "untrimmed." The latter sells at a lower rate, and is not only as good, but really is the same thing as the trimmed. This is a legitimate economy therefore, though it is a rare thing to find a strictly economical dentist who is at the same time a capable one. Dentistry is not a good field for economy. The patient should be given the best of everything, and the best is usually the highest priced. As good a way of cutting gold as any is to tear from the book two or three leaves, with the foil between, and with sharp shears cut both gold and paper. This avoids the unpleasant accident which frequently happens when gold is cut unprotected, where we find that it sticks to the edges of the scissors. These strips should then be loosely rolled into ropes, and cut into pellets suitable to the case for which they are prepared. To illustrate how far I carry this principle, I need only say that I have cut a strip as narrow as one-tenth of the width of the sheet, and have then made the pellets no longer than their width. I further state that this can be done so delicately that the pellets are proportionately as pliable—that is to say as loosely rolled—as where I used a third of a sheet, which is the maximum width to be resorted to. With tiny pellets of this character I fill tiny cavities; those made with the finest of rose burs, and which retain the filling because the bur is dipped first in one direction and then in an opposite. A filling of this kind may be smaller by far than the head of a pin, and yet have required a dozen or more pellets. I have more confidence in a filling so made, than I would have in one made with a single large pellet, however dexterously manipulated, and however bright it may be made to appear. I have seen a clinician fill teeth in this latter way, as a demonstration of "rapid work," and I have been impressed with the idea that we should make *rapidity* subservient to *perfection*.

There is an extreme danger which should be cautiously avoided in using cohesive gold pellets. I think it is usually preferable to fill undercuts with crystal, or some other of the plastic golds. Where this is not done, the foil may be used, but care must be observed in the direction now to be indicated. An undercut usually produces a weakening of a neighboring wall. If a pellet be taken which is much too large for the undercut, and is doubled on itself as it is forced into place, the instrument being between the folds, the whole acts as a wedge, producing a strain against that wall. This may fracture it so that it breaks away, or it may crack it so slightly that the accident may not be noted. Then, when decay creeps in, the usual sermon may be preached: "The tooth has decayed around my filling, but the filling is all right." It is well to be sure that the plugger chosen can be driven to the bottom of an undercut without danger, and then the pellet should be small enough to enter the space without doubling, though large enough to jam slightly; when so placed, it may be driven home with the plugger, which in this case is not *between* the gold, but *behind* it. The action is to compress the gold toward the bottom of the cavity, and not laterally between the walls and the sides of the instrument. This caution to use small pieces should be observed until the undercut is entirely filled. Another thing is that perfect cohesion is gained by this, and is not obtained if any other plan be adopted. How often have we all removed *some other man's filling*, taking it away in a solid mass but leaving gold in the bottom of the undercut? What does that mean? It means that the undercuts were presumably made, to assist in the retention of the filling, but because of the manner of packing the gold, no such result accrued. The explanation lies in this: Gold loses its cohesive property in proportion as it is condensed. Thus having partly filled an undercut, the gold placed therein remaining in position because it is wedged in, we have before us a small surface of gold presented, and an undercut lessened in depth. If the next pellet does not cohere, we would have been as well off with a shallower undercut. If a pellet which is too large be now used, the pressure of the plugger begins to condense it before it is made to touch the gold in the bottom of the groove, the result being that there is less cohesion, if indeed there is any. The principle, then, is to begin with a piece just large enough to be wedged in without lateral pressure, and to add next a similar piece, or one even smaller, so that it will readily reach the first, *and cohere with it before any great pressure has been exerted.* In other words, it should be condensed after it has cohered, instead of before. This one principle observed, will make approximal fillings permanent, which would fail where it is neglected.

For similar reasons, if a pellet by any accident has become slightly compressed, it should be placed in the waste-box. It should under no circumstances be put with the good gold, and finally used in some large cavity. That is an economy which is reprehensible, the more so because it cannot be detected. I saw this done once in a contour filling, by a friend for whom I was malleting. I subsequently saw the same filling, otherwise beautiful, with about one-quarter of its corner broken off. I thought at the time that I understood the accident, and I think so still. The filling had a flaw in it, and the flaw was caused by that bit of partly condensed, and, therefore, imperfectly cohesive, gold.

This compression of a pellet before it is brought into contact with the surface of the already packed gold brings us to another point of great importance. In the approximal surfaces of unusually long bicuspids we may be compelled to work with insufficient space. I mean space insufficient for the placing of a pellet of usual size without compression. The cavity may be one in which we would be authorized to use fairly large pellets ; it may be one in which to use very small pellets would mean to compel the patient to submit to too long an operation. Yet we may find that every pellet, as it is pressed to place either between the teeth or through the possible orifice in the cutting-surface of the tooth, becomes partly compressed. What must be done? After showing that such pellets do not produce good results, it remains only to say that in such circumstances they should not be used at all. The entire filling must be made with rolled gold, otherwise known as heavy foil. This brings me to as good a place as any for explaining what I think the relative values of the three forms of gold. The use of crystal I have told. I would depend upon pellets for everything between the crystal and the last third of the filling, which should invariably be made with heavy foil.

My reason for this is that experience has taught me that fillings completed, or made throughout with heavy foil, will retain their smooth, polished surfaces much longer than any made otherwise. I have a theory to offer as a cause for this. If we take a strip of foil and roll it into a rope, there is necessarily air between the folds. If, now, we cut this into pellets, with each snip of the scissors we compress the edges of a pellet, practically sealing within it several cells of air. When filling with these, we only compress the gold as much as the contained air will permit. It will be claimed here that this is an argument, first, against using such pellets at all, and secondly, in favor of replacing them with the blocks or cylinders which I have condemned. My reply to the first would be that pellets of this kind, in spite of the argument, will make a good gold filling, even used at the surface, and where heavy gold is employed for the last third of the filling, they certainly serve all our purpose. To the second, while admitting that the block or cylinder has the edges open, thus appearing to offer an outlet for any contained air, they are nevertheless open to exactly the same objection, because to surely expel the air it would be necessary in condensing to begin at one point and then work exactly uniformly toward the edges of the pellet, or to start at one end and approach the other, neither of which is probably done in any instance, and surely not with every block or cylinder. The heavy foil is better because it is of a single thickness, and does not contain any air at the start. Yet, even with this magnificent material, care must be observed in the same direction, for if not properly attached and condensed, air-cells will be produced.

(To be continued.)

THE MOUTH AS A CENTER OF INFECTION.

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(Read before the Union Dental Convention of the Fifth, Sixth, Seventh, and Eighth District Dental Societies of the State of New York, at Buffalo, October 28, 1891.)

THE ground included under the above heading has been so often and so thoroughly traversed latterly that it seems a needless repetition to select it as a topic for discussion and possible later publication, and it was only after earnest solicitation by your committee that the present writer consented to consider it particularly, in so brief and imperfect a manner as the time allowed. No apology is made, but let it be said by way of preface that no formal paper will be presented, but a rather cursory review of some points of interest will be attempted, which it is hoped will act as a promoter of discussion.

There are some sides to this question which are of interest to the dentist and physician alike ; and it is with especial reference to these that this discussion will follow. There are also other features which the writer feels are not well known to him, and these will not be considered.

It must, in the beginning, be understood that it is taken for granted that the relation of bacteria, etc., to disease as causative agents is agreed to, or else our ideas are based on false ground, and the premises of this discussion are meaningless.

The conditions as we find them in the mouth are such as predispose to a vigorous and rapid growth of most forms of germs. From this fact it follows that if infectious varieties fall therein they will be propagated, and thus cause the mouth to act as a center of infection.

Many forms have been found in the mouth, most of which we have been able to cultivate and thus determine their species. There are, however, many other forms that apparently will not grow in any of our culture-media, and we know them only by means of the staining methods. The mouth furnishes every requisite for the flourishing of a colony of bacteria : for example, there is the proper temperature, sufficient moisture, a constant supply of oxygen for those that require it, and food in abundance,—the food being furnished by the saliva and such particles of the ingesta as may have remained after a meal. If one could find a perfectly sterile mouth, he could also see at once that the opportunities for seeding it, so to speak, are excellent, in that every individual is more or less constantly taking in air, and also food and drink, through that channel, and in both these actions there are received numberless spores and other forms which, later, give us growths of bacteria. That the air is laden with all sorts of living particles has been well shown by Tyndall's experiments, and it is unnecessary to emphasize the fact that our water as we drink it, and food, even though it be partly sterilized by cooking, contain many spores and germs. It has often been proved that streptococci and the staphylococci are always, or almost always, present in the air, and finding, as they do, favorable soil in the mouth, it is not surprising that many observers have found them almost constantly growing in the buccal cavity. Black's and Wright's* experiments, among others, have abundantly proven this statement.

Of all the forms found in the mouth many are simply saprophytic ; that is, they merely vegetate there, and are incapable of producing harm. There are, on the other hand, a number of forms which we term pathogenic, including the so-called pyogenic bacteria, and these are the varieties which to us are of most interest and importance. It has been said by one observer† that there are over one hundred different species present at one or another time in the human mouth.

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* *New York Medical Journal*, July, 1889.

† Miller, "Micro-Organisms of the Human Mouth." 1891.

One variety, for example, may almost always be found in every mouth; some others are very rarely seen. Then, again, there are varieties which we find present intermittingly; thus, the micrococcus of pneumonia has been found in the mouth at one time, and perhaps in the course of a few weeks or even days it will be absent. The mouth is so environed that some of its inhabitants are able to remain alive, even when they do not grow, and thus are kept living for an indefinite period unless destroyed by accident or in the struggle for existence which befalls these minute creatures as well as others. If such species were cast out at random they would languish and die, and with them would perish their potentiality of disease.

The saliva, as it flows from its ducts, has been found to be sterile. We have, therefore, no species derived from the glands themselves; we are safe in saying that all infectious forms whatsoever which are found in the mouth are derived from the various sources mentioned above, to wit, the air, food, or drink ingested.

The so-called saprophytic forms can be dismissed with perhaps only a mere mention. They are productive of no harm and become abundant only in certain low conditions, as typhoid, or profound pneumonia. Here the condition of the patient is such that these species have opportunity to grow and multiply, whereas in health they do not find so good an opportunity to plant themselves as securely in or on mucous membrane and propagate their species, because of the tendency of the healthy surfaces to throw out any such foreign bodies.

The pathogenic forms, on the other hand, are all of so much importance that one could easily devote an entire lecture to the consideration of one or two varieties. Under this head are included many of our most virulent bacteria. The fact of the presence of these virulent species brings up many interesting questions. If we assume that the germ of erysipelas is present in a given mouth,—and this is not taking any great license,—or that of diphtheria, then the question arises, Why do we not always have erysipelas or diphtheria following? This question is also just as forcible in considering those forms which produce inflammation (the streptococci) and that form which causes pneumonia (the pneumococcus). A great many theories and many speculations have been published concerning the problem, why on one hand we may have the disease following when a given germ is present, and on the other hand, in spite of the presence of the germ, no disease ensues. While of exceeding great interest, this question would take us too far from our subject to consider it with proper justice.

It has been shown that certain germs grow better when inoculated into animals at a given age; for example, some grow better in young animals, others in old, and the question of age is thus put down as one qualifying feature. There is also the factor of attenuation, as it is called. By this is meant that if a certain variety be cultivated through a number of generations it is found that such a species loses its potency, and perhaps at the end of a hundred generations it will be found that it can be inoculated into an animal without producing the effect that the first generation would have caused; the more remote, in time, the disease is from the species secured from it, the feebler becomes the species. In this connection we can instance observation, and experiments where staphylococci taken recently from pus are very potent, and when after cultivation for many generations the descendants of the same individuals are markedly weaker in their abilities to cause their characteristic disease.

The feature of ill health or vigorous health is also to be taken into consideration. We have hinted at this in speaking of the growth of saprophytic forms in typhoid fever. The question whether a surface is broken, or has its normal continuity, is one of much importance, and often it may not be absolutely necessary to have a surface really abraded. This has been well shown by Hodenpyle* in his experiments and researches on the tonsil. He has shown that there are at times on the normal tonsil areas which, instead of having a layer of epithelial cells two or three rows in thickness, have become what he calls rarefied. That is to say, the cells are then only one layer in thickness. He has hence assumed, and it seems to me with propriety, that virulent forms may be able to gain entrance into the circulation or to the subcutaneous tissues with more ease through this thinned layer of epithelium than through a normal layer made up of several rows of cells. What causes such rarefications is not well known ; the fact remains that they do occur, and helps to explain the way of many infections when no history of a previous injury is at hand.

There are certain general conditions which predispose to infection by germs. A patient with diabetes is well known to be more liable to inflammatory processes than one free from this malady. In such patients it is a common matter of observation to notice phlegmonous and erysipelatous processes. This fact has been well explained by certain observations, which are about as follows : If a pure culture of the Staphylococcus aureus be injected into a rabbit in small doses, it is taken care of by the economy, and there results no inflammatory process or abscess. If, however, a similar dose be mixed with a moderately strong solution of sugar and injected as was the first, then there result, on the contrary, well-defined inflammatory reaction or easily noticeable abscesses, and thus the presence of the sugar is taken as an explanation for the so frequent appearance of abscesses or inflammatory processes in diabetes. With the germ of pneumonia it is not so easy to find a ready way out of the difficulty. Here, it is assumed, in order to have an attack of pneumonia, the system of the patient must be below par ; if there be an area of hyperemia in the lung, caused by a cold, then this area, not having a proper circulation, is more easily and readily attacked by the germ of pneumonia if it be present, and there results the characteristic disease.

Such opportunities for infection as a fracture of the jaw with penetration of the soft tissues, extraction of teeth, gum-lancing, and the like are so patent that it seems almost unnecessary to mention them. They are of interest because of the fact that by no means do we always find an infectious process following the infliction of such injuries. This is easily explicable if we call into play the so-called phagocytic action of the cells of the body, particularly the white cells of the blood. It is assumed in such cases that the processes of repair that ensue not only are concerned in healing and mending the injury, but that they take part also in destroying and fencing out, so to speak, any of these infectious germs which may have attempted to gain entrance. It must also be remembered that with some species a certain number of individuals are necessary in order to produce the given disease: if the bacteria are but sparingly abundant the body-cells are victorious in the battle, and no disease follows; whereas if the germs be plentiful, the body-cells are not able to cope with them, but succumb, and disease ensues.

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* *Amer. Jour. Med. Sci.*, March, 1891.

There is one phase of the action of our tissues which, it seems to me, is of particular importance to both the dentist and the physician, and that is the effect of the so-called lymphatic glands. These structures were formerly said to be glands, and little was known concerning their function. It is now pretty well established that they act as filters, as it were, to the lymph-flow in the lymphatic vessels, and in this way sift out any foreign particles or bodies that may have gained entrance into this circulation. This action is beautifully illustrated in the lungs, where, for example, with people who live in cities in which there is much smoke, or miners who work in dusty places, it will be found that the lymph-nodes are pigmented of a very deep brown or black. If this pigment be examined it will be seen to be made up entirely of carbonaceous material which was primarily taken into the lungs, picked up by the lymphatic stomata of the mucous surfaces, and carried to the lymph-nodes, which, acting as filters, detained it there. Now, if there are abraded surfaces in the mouth, such as are produced by wounds, or those which are more or less constantly present and are caused by broken teeth, badly-fitting plates, etc., we find that the lymph-nodes beneath the jaw, in the neck, or even so far as behind the ear, become enlarged, and at times quite tender. The nodes under these conditions may, in fact, even suppurate. The explanation is quite apparent. Such broken surfaces have allowed the lymphatics going thereto to take up any of the infectious bacteria which may have been present in the mouth and upon these surfaces, and have allowed the lymph-stream to carry them to the nearest node. Here, acting as foreign bodies and also as marked irritants, the bacteria have caused the characteristic changes in the lymphatics which we know are peculiar to specific inflammation and are produced by certain varieties of bacteria. This is especially so with such forms as the germs of syphilis, tuberculosis, actinomycosis, etc.

The infection of these bodies—the lymphatics—by the bacillus of tuberculosis is probably the one to which we ought to pay most attention. It has been shown in a series of one thousand children examined for enlarged lymphatics in connection with faulty dentition, that of five hundred who had no bad teeth the percentage of lymphatic enlargement was 49, whereas, of five hundred children having bad teeth, the percentage was 99, a record which ought to convince the most skeptical that broken teeth, ragged gums, etc., are of marked importance in causing the hideous deformities which often result from enlargement of lymphatic nodes about the neck and jaw.

We are safe in believing that probably seventy-five per cent. of all similar lymphatic enlargements are tubercular in nature; one can appreciate from this the importance of correcting all predisposing causes to lessen, if for nothing else, the possibility of secondary general tuberculous infection.

Shurly, of Detroit,* has recently published a case which is of great interest, and which brings up questions of great weight. He met with a case of purulent rhinitis in the body of a museum monkey ; a diagnosis of tuberculosis was given, and confirmed by the presence of the bacillus of tuberculosis ; at the autopsy no anatomical indications whatever of the existence of tuberculosis could be detected, neither microscopic nor macroscopic, and in explanation it was suggested that perhaps owing to the presence of the discharge, the tubercle bacilli were able to maintain a saprophytic existence in the nose, while not penetrating at all into the tissues proper. If this be true, it would seem possible for the same species to act as saprophytes in a human mouth, if it be unhealthy because of want of proper care, or because of bad teeth or other dental defects ; and with these bacilli constantly present the chances of general infection are many times enhanced.

It seems to the writer that every physician and dentist ought to be acquainted with these facts, and that if a dentist, in treating a patient, notices that the lymphatics are affected, it is his duty to correct any dental error which may exist, and, if necessary, direct that proper mouth-washes be employed and the use of the tooth-brush with antiseptic powders be insisted upon. On the other hand, a physician should always inquire, among other things, of patients who consult him for the relief of lymphatic enlargement, for the presence of poor teeth, and, if they are found, direct that such defects be corrected at once by a competent dentist.

The possibility of infection with syphilis, tuberculosis, actinomycosis, and other diseases is one that has been investigated with great diligence, and the consideration of one of these diseases alone in this light would lead us too far astray. The chances of syphilitic infection of the operator or his patient must always be borne in mind, and every precaution against it ought to be employed.

Now, having all sorts of infectious forms more or less constantly present in the mouth, we must not forget that there are cavities which connect with the mouth, which are of great importance, and which are liable at any time to become infected through the mouth as the primary center. Thus it is very easy under certain conditions to have an inflammation of the middle ear arise through infection from the mouth *via* the Eustachian tubes. Infection may also travel upward into the nose, downward into the throat, and outward into the parotid, through its excretory duct, and more rarely upward through the nose into the antrum. There is a chance of infection which is more remote than any of those above mentioned, but which is of vastly more importance when it does occur. I have here in mind the possibility of infecting the brain and its membranes through the ethmoid bone by way of the nose. It has been my experience to make autopsies on at least two cases of abscess in the frontal lobes with purulent meningitis, which undoubtedly followed operation on the nose, and where it is probable that the operation acted as a depressing cause and permitted the growth of such pyogenic forms as were present there before the operation, and which after once gaining a foothold in the tissues easily traveled upward through the ethmoid cells into the brain, and very speedily produced a fatal result.

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* *New York Med. Journal,* Nov. 7, 1891.

The results of bacteriological investigation of the mouth teach us several very important lessons. We ought to endeavor personally not only to render the mouth as aseptic and sterile as possible, but we ought also to impress it upon every patient that it is as much his duty to attend to this as it is to keep the skin clean. In so doing we not only lessen the possibility of personal infection in every patient, but we also destroy to a certain extent a center of disease, and in that way lessen the number of germs which are daily cast about to later float in the air and find a footing elsewhere. To keep the mouth reasonably aseptic is not an easy matter; to render it sterile is impossible. But by the use of antiseptic washes and the tooth-brush we can at least accomplish this in a measure. These investigations also teach us the necessity of everyone breathing, as he should, through his nose. Jonathan Wright's* experiments are, in this connection, of much interest. He has found that if ten liters of air be inspired through the nose it will contain, if expelled from the mouth, but twenty-four germs saprophytic in nature, and one pathogenic in nature, whereas this same volume of air ordinarily contains four pathogenic forms and one hundred and twenty-five saprophytic, showing very clearly that the purpose of all the windings and increase of surface in the nose is to afford a filter to sift out any such foreign particles or bodies; and that its mucosa is supplied with ciliated epithelium for similar reasons, to assist in this purification.

If nose-breathing is not possible, because of a deviated septum, a hypertrophied turbinate, hypertrophied mucous membrane, a cicatricial stenosis, or whatever else it may be, and the dentist or physician discovers it, then it is his duty to advise immediate correction, in order that a normal respiratory method may be learned and practiced. These investigations also teach us that, in our manipulations in the mouth and any of its adnexa, we ought to be as antiseptic or even aseptic as possible. This of course includes the use of antiseptics about our instruments, of preliminary mouth-washes, and of post-operative mouth-washes. It is not necessary to enlarge upon this latter point, because the writer feels you are more thoroughly acquainted with these details than he.

Councilman, of Baltimore, has remarked that "every surgical operation is in nature a bacteriological experiment," and one that surely cannot be made at one's pleasure in the laboratory! If this be true, what experimenters dentists and surgeons are! and, unfortunately, sometimes their experiments in these lines are successful, much to their chagrin and the patient's discomfort. It seems to the writer that the remark of Von Mosetig-Moorhof* ought to be in the mind of every dentist and every surgeon who operates on the mouth, because of its truthfulness and importance. He says, "Operative dentistry is a specialty of surgery; those who practice it must consequently be acquainted with at least the fundamental principles upon which surgery is based. Now, the fundamental principle of modern surgery is antisepsis, and the dentist ought and dare not practice without it."

The writer is imbued with the idea that every medical and dental school in this country—in the world—should understand and realize the importance of the *rôle* played by the mouth in perpetuating and propagating disease-germs, and, if they do not already do so, should teach it to every student within their walls.

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* *Ibid.*

† Miller, *ibid.*

REMARKS ON THE RELATIVE PATHOLOGY OF THE TEETH, WITH INCIDENTAL HINTS ON THERAPEUTICS.

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It is not my purpose to be exhaustive in the treatment of the subject as given in the title of this paper. I have decided upon the present topic because of its practical worth ; and having been thus influenced in the selection of the theme, I shall follow the same guidance in the treatment of it.

The relation of the teeth to diseases of the mouth, and *vice versa*, is of interest and importance to the dentist as well as to the physician. Take, for example, *fœtor ex ore*. The dentist should not only be able to decide at once whether the cause of this lies within or without his domain, but should also have an intelligent idea of all the causes which tend to its production. It may be stated broadly that all diseases of the mouth, and many of those attacking the neighboring cavities, produce *fœtor ex ore*. The odor accompanying ozena is so characteristic that we may often decide the diagnosis without any elaborate nasal examination, but the stinking products of chronic lacunar tonsillitis may produce an odor which closely resembles that of ozena, and I would especially direct attention to this disease. The white patches on the tonsils are easily seen. One or more lacunæ may be affected. Their contents consist of whitish, stinking plugs, the hardened products of inflammation or particles of food which lodge in the crypts and there decompose. They often produce an intolerable *fœtor ex ore*, and I have treated a number of patients who suffered in consequence from antipathy to food, and from gastric and intestinal catarrh, all of these symptoms disappearing after the primary disease had been relieved. (Eichorst.)

Fœtor ex ore accompanies nearly all the catarrhal diseases of the buccal mucous membrane. Catarrh here may be primary or secondary, acute or chronic. Primary stomatitis is generally the result of thermal, mechanical, or chemical irritants.

Among the mechanical irritants the sharp edges of decayed or even misplaced teeth are of first importance. But we may have a stomatitis from simply "taking cold," or from too hot food, drinking, and smoking. Or the disease may accompany a catarrhal inflammation of the nasal, pharyngeal, or laryngeal mucous membrane. And I have seen such a case where the laryngitis in a singer was materially benefited by the extraction of an offending molar.

The inflammation is more often circumscribed than diffuse, and when the latter is the case and mild in character, it may entirely escape notice, although the odor arising therefrom may be quite offensive. Otherwise the inflamed parts are extremely red, uniformly, or in an arborescent manner. The mucous membrane is swollen. If the tongue or cheeks are affected, the impress of the teeth is made therein. Occasionally the mucous glands take a more active part in the process, especially those of the mucous membrane covering the lips and that between the hard and soft palate. They form small elevations of a pearly-gray color, and upon pressure often discharge a mucoid or puriform fluid. A red, vascular zone frequently surrounds these elevations. Rarely these vesicles rupture and give rise to superficial losses of substance. (Eichorst.)

In the inflammatory process the superficial epithelial cells become separated from the deeper layers, thus forming the "coating" seen on the inflamed parts. It may be removable or adherent according as the process of desquamation is complete or not. In color it is grayish, yellowish, or brownish, or the color may depend upon food or medicaments. I have in such a case been able to remove, by gently scraping, innumerable complete epithelial casts of the fungoid papillæ.

The coating of the mouth consists, in addition to epithelium, of food *débris*, bacteria, pus-corpuscles, occasionally blood-corpuscles, and, according to Miquel, cholesterin crystals and lime-salts.

As a rule, the temperature of the patient, except it be in infants, is unaffected. But the general condition may be more or less influenced, especially if anorexia supervene, which is often the case. It is well to remember that in infancy and younger childhood the mouth is liable to inflammatory processes, and that such inflammations exclusive of all dentition may produce symptoms of varying intensity, from refusal of the breast to convulsions.

The diagnosis is easy, but we must not regard every coating of the tongue as evidence of stomatitis. There is a coating which arises on the posterior part of the tongues of many persons in perfect health. We cannot regard this as in any way pathological.

Ulcerative stomatitis we have grown to regard as an entity, but it is in reality a generalization which may be misleading. Thus we may have ulceration of the mouth accompanying many diseases, and which depends usually upon the same cause as that which produced the primary disease. Thus we speak of ulcerative stomatitis accompanying phthisis, which is in reality nothing more than tubercular ulceration or infection of the buccal mucous membrane. So, too, we speak of mercurial stomatitis and stomatitis scorbutica. But there is a form of ulcerating stomatitis which we may regard as a disease *per se*,—the so-called idiopathic stomacace. Its etiology is not as yet made clear, but it is my belief that besides unhygienic surroundings it is dependent upon some peculiar specific infection. In support of this view I will call your attention to its endemic character and the ulceration of opposing surfaces, one surface infecting the opposite, as, for example, the gum and cheek, or the tongue and gum, etc. Fruwald believes that the Bacillus fœtidus pyogenes plays an important *rôle* in its causation. But the vicious hygienic surroundings are of equal importance to the real infection, as shown by the fact that when the disease breaks out in barracks the officers usually escape.

This idiopathic stomatitis begins usually in an acute, occasionally in a chronic manner, with the appearance of a catarrhal inflammation of the edges of the gums of the under jaw. In a short time (two to three days) in the acute form, in as many weeks or months in the chronic, the affected gum is cast off in a yellowish, foul mass, leaving an ulcer, which bleeds at the slightest touch. In consequence of this the teeth become loosened and fall out. In the most severe cases the periosteum of the bones of the face is attacked, and gangrene supervenes. And right here I would mention a form of ulceration which I am inclined to look upon as peculiar. Three cases have been brought to my notice lately, the last one under circumstances that led me to determine to speak upon the subject at the earliest opportunity. I refer to an ulceration which occurs on the buccal mucous membrane opposite the upper wisdom-teeth. The patients brought to my notice were markedly anemic and irritable, but in spite of a thorough examination no traces of tuberculosis or syphilis could be discovered. The last patient, which I shall take as an example, was referred to me two weeks ago by the family physician, who was inclined to look upon the ulceration as carcinomatous in character, and had inadvertently and unfortunately hinted his opinion to the relatives of the patient. Upon examination, the mucous membrane appeared pale and œdematous, the impress of the teeth being visible in it. At a point opposite to the wisdom-tooth (upper right), which did not seem to be materially misplaced, was an ulcer slightly smaller than a dime, with sharply-cut edges, extending to and into the submucous membrane, and having a smooth, bluish-red base. There was no induration or hardness. The distinctive feature was the almost complete absence of an inflammatory process, a fact to be accounted for, I believe, by a pronounced resistance to secondary infection. When touched with a probe it was found to be quite sensitive. There was no *fœtor ex ore*. This ulcerative process had existed for about a month. The first inconvenience experienced from the cutting of the wisdom-tooth had occurred some time previous. This fact had been the cause of doubt in the family physician's mind as to the relation of the tooth to the ulceration ; but when we know that the wisdom-tooth in the other two cases brought to my notice had been cut from four to seven months previous to the appearance of the ulceration, we may conclude that the mere cutting of the tooth is of only negative importance in relation to the ulceration. Now, as to the cause of this ulcerative process. It seems to me that a low degree of vitality is the prime factor in its causation exclusive of specific disease. Such a state is present in simple anemia. In these cases, too, there is always present a sodden or œdematous condition of the mucous membrane to a greater or less degree. The active agent is the pressure exerted between one of the wisdom-teeth of the upper jaw and the anterior edge of the masseter muscle. Another fact which I have noticed, and which will bear upon the process in question, is that in ulcerative or inflammatory processes in the mouth or fauces there is more or less of a tetanic contraction of the masseter, and an inhibition of those muscles operating to open the mouth. This condition of the masseter only adds greater pressure, and the process is augmented. The treatment is simple after the diagnosis is clear. If the wisdom-tooth is decayed or functionally worthless, it may be extracted. Otherwise I find that nitrate of silver applied in the form of the mitigated stick is serviceable, while pressure may be relieved by a pledget of cotton kept fixed between the points of contact. In all cases the anemia should be counteracted, from whatever cause.

Another process of disease which is really related to the above is the syphilitic. Those who have seen only a few cases of the buccal manifestations of this malady can remember the whitish linear plaques around the teeth upon which has been deposited the so-called tartar. Indeed, I have had occasion lately to send a patient to one of your members while suffering from such secondary manifestations. A sharp edge of a tooth may produce ulcerative and inflammatory process in the disease, which absolutely rebels against all specific treatment until the point of irritation is removed. I deem it advisable in all cases of syphilis in the second stage, where the patient can afford it, to have all tartar removed before commencing the administration of mercury, and if there are sharp or jagged teeth, to either have them extracted or the point of irritation removed. In Vienna I saw a case where a large tertiary ulcer existed just opposite the first molar, or rather the sharply-projecting remains of it, which refused to heal under specific medication alone, but which healed nicely immediately after the "snag" was removed. And apropos of dental operations during the course of syphilis, I would like to say a word regarding the care of instruments after such operations. There can be no doubt that syphilis may be transmitted by instrumentation. A case of such transmission is on record in which the carrier was nothing more than a laryngeal mirror. Therefore we throat specialists have two sets of instruments,—some of the most careful even three sets, one for syphilis, one for tuberculosis, and one set for non-contagious diseases. But such provision may not be expected in a dentist, because he has relatively few specific cases to treat, and besides, his instruments, with the exception of the mirror, are capable of thorough sterilization. Now, how may this be best effected? To be terse, the best method by far is the boiling of all metallic instruments in either plain water or five per cent. carbolic acid, to which has been added a small amount of sodium bicarbonate, for from fifteen minutes to half an hour,—the longer the better. The destructible instruments, such as the mirror, should be immersed in or carefully rubbed over with a mixture of equal parts of glycerin and carbolic acid. Then all is safe. It is unnecessary to say that the hands should not come in contact with the excretions or secretions of a syphilitic mouth, if it is possible to avoid it, and after operating should be cleaned with brush and soap and water, rinsed in alcohol, and sterilized in 1–2000 corrosive sublimate solution.

The tumors which develop from the teeth themselves are designated odontomes. They develop from the pulp during the dentification, and form protuberances or excrescences from the crown or root.

Those tumors developing in later life from dental substance were first named by Ulrich, the dentist, odontoids. According to the substance from which they were developed, from dentine or cement, or a combination of the two, they were called emailoide, email-dentinoide, dentinoide, dentinoide and osteoid. These growths are small, often only first discernible when the magnifying-glass is used.

By the name calcoid is known a growth from the pulp, which contains connective tissue and traces of a cement-like substance.

Sarcomata, fibromata, myxomata, occasionally develop from the pulp at the time of dentition; more frequently sarcomata and fibromata from the periosteum lining the alveolus or alveolar process, or even from the medulla of the inferior maxilla. All such tumors come under the head of epulis, about which there has been a good deal of unnecessary confusion.

Let us now pass to a most important subject,—the relation of the teeth to empyema of the antrum of Highmore. I prefer this term to abscess, inasmuch as the latter term is not altogether correct, because it is not a suppuration occurring in the parenchyma of an organ, but in a pre-existing cavity. The anatomical connections with the teeth vary considerably in various cases, both as regards the extent of the antrum over the roots of many or few teeth, as well as the degree in which they are separated from it by bone-substance. It may extend so as to be in relation to all the teeth of the superior maxilla. They may even pierce the floor of the antrum, and be covered only by the mucous membrane lining the cavity. Its capacity is 10–12 cc. It may be so low as 8.5, or as high as 15 c.cm. Another anatomical point to be borne in mind is the opening in the middle of the nose.

Now, there are three modes of infection from without. By direct infection of the mucous membrane lining the cavity, which usually takes place from the nose, and indirectly from extension of inflammation from carious teeth, or through the systemic circulation. The infection from dental caries is by far the most frequent, but that from the nose comes second, and that it is by no means infrequent should be well borne in mind, while systemic infection must be rare and most frequently occurs in tubercular disease. In direct infection of the mucous membrane lining the antrum, the hypertrophic diseases of the nose and naso-pharynx play a most important part. Whether this hypertrophy be general or local, whether post-nasal or just at the hiatus, the effect is the same,—a diminished circulation of air in the antrum. According to the experiments of Scheetz, normal nasal respiration produces in the antrum alternating rarefaction and compression of the contained air, which has a marked influence upon the circulation occurring in the antrum. When communication between the nose and antrum is cut off or diminished by hypertrophy or any other cause operating against free nasal respiration, the circulation in the antrum is perverted, the vessels become congested, the mucous membrane becomes œdematous, and the epithelial cells loosened. We can readily see in this condition how the pyogenic bacteria might find a most salubrious resting-place. And this, in fact, happens. The mucous membrane is attacked, and the round cells which it throws out in its protective efforts, contained in the albuminoid fluids derived from the plasma, go to make up what we know as pus. Still, it may happen that the engorged mucous membrane withstands septic infection, although the fluid parts of the blood contained in the congested vessels are exuded in great quantities, thus giving us what we know as cystic disease of the antrum.

In the extension of infection from a carious tooth we have the suppurating process extending from the apex of the root, making its way in the direction of least resistance through intervening structures until it arrives beneath the membrane lining the antrum. Here we at first have a circumscribed accumulation of pus, which bulges the mucous membrane out into the cavity of the antrum. Now this may become encysted at this late time, or a means of drainage being naturally made by means of a sinus connected with the oral cavity along the tooth-root, or otherwise, the antrum may be saved from infection. Usually, however, it breaks into the antrum, and we have the same sequence of events as in direct superficial infection.

In systemic infection a small particle of the infective material forms a thrombus in the bony structures, setting up a central osteomyelitis with subsequent involvement of the intervening structures.

Now, it appears from this that in order to institute proper treatment it is of the utmost importance to first determine at which point infection originates. But of this more anon.

The symptomatology varies much in severity and obviousness. The general symptoms are those of pus in any closed cavity: more or less febrile symptoms; pain at the seat of disease, which is usually described as dull or boring. Latterly the walls of the antrum may be pushed outward in the direction of the cheek, the mouth, the nose, or orbit, with consequent displacement of these structures. It is easy enough to make a diagnosis at such a late date, when these displacements have occurred.

The points upon which I place the greatest dependence in diagnosis are:

1. Accumulation and sudden reaccumulation of pus at the hiatus.
2. Relative darkness occasioned over the diseased maxilla when the bones of the face are illuminated.
3. Puncture through the nose and withdrawal of fluid by means of an ordinary syringe.

In the first point we see upon examining the nose an accumulation of whitish, yellowish, or greenish matter in the middle meatus, at a point about half an inch from the anterior end of the inferior turbinated body. This I wipe away, and possibly examine microscopically after a time. But immediately after wiping the pus away I cause the patient to throw his head suddenly to the opposite side, so that the head is parallel with the floor, in which position it is held for a few moments, when the upright position is again assumed, and the nose examined. In nearly every case of suppuration in the antrum more or less pus will be seen at the point above mentioned. I place great importance upon this maneuver.

The second point is illumination of the bones of the face by means of an electric lamp held in the mouth, and the patient examined in a completely darkened room. Under these conditions the presence of fluid in the antrum will interrupt the rays of light passing through the tissues, thus causing the affected side to appear darker than the sound side. This requires no special technique. A small electric lamp is held in the mouth, the lips closed firmly over it, and the circuit closed. We should be careful to remove tooth-plates or prosthetic apparatus beforehand.

Operations by means of an ordinary hypodermic needle of moderate strength may be easily performed through the walls of the nose just within the nostrils.

Treatment.—From the foregoing remarks it may be seen that the various origins of suppuration within the antrum should influence us in our treatment. That the antrum should be promptly and thoroughly drained is obvious. But in which way shall we drain—through the alveolar process, the hiatus, or canine fossa? And just here we see the importance of first finding out the exact source of infection. If the suppuration occurs from direct superficial infection, it is very near bad practice to draw a sound tooth and drain through the socket, leaving the hypertrophic or adenoid disease in the nose or naso-pharynx untouched. While I am not in favor of drainage through the nose, I am in favor of drainage through the canine fossa in such cases. I hold in my hand an instrument much used by Chateleaux in drilling into the antrum through the canine fossa. Over the point is passed a canula having perforations along its walls for the escape of secretions, and a shoulder at the distal end. It is a kind of bone trochar. After being inserted into the antrum the drill is withdrawn, and the canula allowed to remain. The results of this mode of treatment I can vouch for as being excellent. The operation is painless under cocaine, and drainage is thorough. I usually use 1-1000 or 2000 sublimate solution for washing out.

In case the suppuration was of dental origin, the offending tooth should be removed, as you well know, and drainage instituted through the socket by chiseling or burring an opening through the bony structures into the antrum. Without a canula of metal the opening should be large. Some surgeons first extract the tooth, and then wait until the soft parts are healed before going through the bone. The tooth usually extracted is the first molar ; the third is also good.

In closing, I would like to again call attention to the mode of operating through the canine fossa.

Points in its favor are that we lose no tooth in the operation, drainage is perfect, the operation itself much less painful than that taking place through the alveolar process. It should be the operation selected in draining the antrum in edentulous conditions. It should be chosen in operating for empyema Highmori dependent upon all causes outside of dental abscess.

COMBINATIONS OF PLASTICS AND FOIL, AND THEIR USES.

BY J. EDW. LINE, D.D.S., ROCHESTER, N. Y.

(Read before the First District Dental Society of the State of New York, Dec. 8, 1891.)

FOR a number of years past members of the profession have discussed generally, and to a greater degree perhaps within the limits of their respective local organizations specifically, many and various combinations of filling-materials in their mechanical and chemical relations to tooth-tissue and the oral secretions ; and through the intelligent and persistent efforts of these gentlemen we have arrived at a pretty good understanding of some of their combinations, likewise of practice involving their use. Gold and tin, gold and amalgam, filings of pure tin, or quite as often those of alloy used in making amalgam, amalgam itself in a plastic state, gutta-percha and oxyphosphate,—these, one with another in admixture, have been presented in such form from time to time that little if anything new of value can be added thereto at present. For our own part we are content to let rest what has been done, and take up a phase of the subject as yet untouched, but which seems entitled to some consideration and possibly a not inconspicuous place in daily practice.

The materials of the combinations in question are gold, tin, gutta-percha, and oxyphosphate. Gold and tin and gold and amalgam are much used, generally in bulk,—that is, masses of each in a given, or at times, indiscriminate relation ; while tin or amalgam, in combination with gutta-percha or oxyphosphate, are made to answer the requirements of the operator only when reduced to the form of filings.

In a sketch of the doings of the State Society at its meeting in 1890, Dr. Chas. S. Butler, of Buffalo, is credited with the report of a case, which, while not common, happens in sufficient frequency to put the operator at times at his wits' ends. He solved the problem presented by this case most satisfactorily to himself, also to the patient ; and at the same time suggested experimentation the result of which is the method we have since elaborated to serve our own and, if it strike others as favorably, their professional end,—that of making comfortable and prolonging the usefulness of teeth of doubtful structure and stability. Gutta-percha was the only thing admissible in Dr. Butler's case, but the effect of attrition on these molar fillings had made its introduction a too frequent necessity. On this occasion, however, he softened the surface of the gutta-percha with chloroform and heat, if we remember correctly, and by means of broad-faced pluggers worked into the mass a goodly quantity of filings of alloy. He said he had also resorted to this method in approximal cavities, using the matrix, and with good results.

Recognizing the superiority of this combination over gutta-percha alone, we began to experiment. Chloroform in quantities sufficient to soften and resoften the surface of the stopping proved, as we had anticipated, disagreeable to many ; so also with eucalyptol, our only other solvent of gutta-percha always at hand ; and the repeated application of heat, by means of plugger or burnisher, baked the gutta-percha to brittleness. The notion of working filings into the gutta-percha in either of these ways was therefore abandoned.

Recalling an advertisement of weighted gutta-percha, we sent for a couple of sheets said to be loaded with filings of pure tin. This when fresh is dull red in color, but no more like pink or white gutta-percha, as to plasticity, than so much leather. It proved difficult to soften, did not adhere to the tooth, offended the eye, and grew more unsightly with age. It wore well, however, when the form of the cavity was such that it could not be dislodged in bulk by mastication. A second order for weighted material brought as bad a lot as the first, with the information that white, tin-weighted gutta-percha was not in the market.

Our next step was to incorporate filings into the ordinary white gutta-percha. This worked well, but the act of incorporation blackened the mass, and then where most needed for stability's sake, as, for example, in the crown of a molar without a lingual wall, because of the heat of the mouth and the work of mastication it soon flowed over the edge, impinged on the gum, and in some cases initiated trouble in that tissue and the peridental membrane, for all the world like the old-time article of daily use. This preparation has its use, however, in that it enables one easily to get tin in contact with dentine* where tin alone or amalgam would not be admissible for thermal and other reasons.

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* For the purpose of favoring, if not inducing recalcification, a clinical fact *known* notwithstanding the fact alleged that tin as a therapeutic has no place in dental practice.

A further and final step was the alternation in the same cavity of gutta-percha and tin, the latter in the form of single pieces of heavy foil like that used in thin patterns for so-called air-chambers, or cylinders of ordinary foil made flat by compression with the pliers or between the thumb and finger. This alternation of gutta-percha and tin, it should be said, was not thought of nor put into practice until we had learned the value of the method in its application to gold or tin imbedded in oxyphosphate, of which more will be said presently.

Gutta-percha has many advantages in certain cases over other materials ; so, too, has tin. Either may be used in a given tooth, and the sole objection to gutta-percha in a particular case may be that it soon wears out ; to tin, that it is practically non-cohesive, and the force necessary for its introduction may fracture frail walls and thus ruin an otherwise good tooth. But this objection to gutta-percha needs modifying in that the depth of the wear is directly as the diameter of the cavity and the direction of the force applied. For instance, in a cavity in a superior or inferior first molar, say one-eighth inch diameter (Fig. 1), the cutting out (*a*) is slight ; if one-fourth inch it is correspondingly greater (*b*, Fig. 2) ; if three-eighths greater still (*c*, Fig. 3). Now, the force that does this in the grinding-surface of a molar is compound, the resultant of the retraction and lateral motion of the lower jaw ; and the scooping out of the material indicates the direction of the force engaged in the work. In a buccal cavity, of say a lower molar, attrition by food need not have anything to do with the waste, but the sweep of the brush front and back concaves the gutta-percha filling from above and below and from front to back, thus effecting the same end. Thus we see that the larger and more exposed the cavity, the greater need of something in the gutta-percha to resist mechanical wear and tear and prolong the usefulness of the filling. Heavy tin foil, above and below thirty-two gauge, alternated with gutta-percha, the tin transversely to the force expended on the filling, meets this requirement more fully than anything else, assuming more or less of gutta-percha a necessity as an adhesive in the preservation of a given tooth.

FIG. 1.

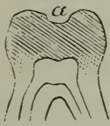


FIG. 2.

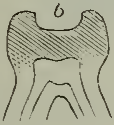


FIG. 3.

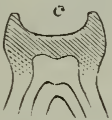


FIG. 4.

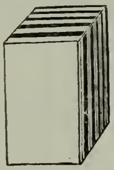
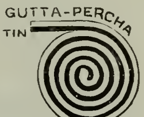


FIG. 5.



This combination may be made in the cavity, or the materials may be combined before introduction ; both methods are useful, and in certain cases each has some advantage over the other. The combination made beforehand consists of gutta-percha and tin in alternate layers, flat (Fig. 4), or in the form of rolls or cylinders (Fig. 5). In introducing the pieces a square or pellet of gutta-percha is packed by means of heated instruments against the walls of the cavity ; a piece of tin a little higher than the cavity is deep (and if an approximal cavity, large enough to project for a finish) is placed next, and by applied heat made to adapt and adhere ; then another piece of gutta-percha, then tin, and so on until the work is complete. If tin and gutta-percha are used in the cylindrical form, the rolls should be stood on end. The layers should be, as suggested a moment ago, placed nearly transversely in molar crown cavities,—that is, diagonally from lingual to buccal sides; in buccal cavities vertically only.

This rule will not apply, of course, in crown-approximal cavities. Here the tin and gutta-percha layers must lie in the antero-posterior axis of the tooth; and, while the filling does not wear as well as in the transverse position, it wears much longer than gutta-percha alone. But if for no other reason, it would be worth while to resort to this method for mere reduction of the size of cavity,—one piece or partition of tin would more than double the durability of the filling. In transverse section a molar crown-cavity filling well worn would appear as in Fig. 6, *a*; divided by a tin partition, as in Fig. 7, *b*; by two, three, or more pieces, as in Fig. 8, *c*.

To test this matter out of the mouth, fill a series of thimbles or ferrules with plaster of Paris, dividing some of them by one, some by two, three, etc., pieces of tin; then fix the series in a mass of plaster, and when hard apply a tooth-brush, noting the wear.

Fig. 6.

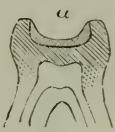


Fig. 7.

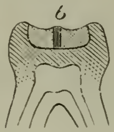
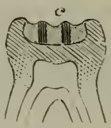


Fig. 8.



To finish fillings of this kind, use a corundum point and water for grinding-surfaces, and a sickle scaler, coarsely sharpened on a corundum slab, for approximal.

Further applications of these gutta-percha and tin combinations will suggest themselves so readily, that we leave them for a consideration of the combinations of gold and cement, and cement and tin. More than a year ago, and while combinations were uppermost, we had a call from an extremely nervous lady, who had had much and varied experience, likewise much suffering, from her teeth at times of operation. From her warning on the day of making the appointment, we anticipated trouble, and on opening into a posterior approximal cavity in a lower molar, found it. We applied the dam forthwith, dried the cavity, excavated till patience became a vice, and with a cavity half prepared, the walls soft and ill-shapen, we decided on a combination of gold and cement as a filling. To this end we made a number of large cylinders of No. 4 foil, flattened thin for wedging, and then filling the cavity with a thinly-mixed mass of oxyphosphate, set them side by side in the cement, the outer ends against the farther molar, and drove them home, the superfluous cement escaping on all sides. This secured the vulnerable part of the tooth. On this layer we built another layer of cylinders, also in cement, wedging them sidewise by means of a thin burnisher, the gold projecting from the cavity as before. Half an hour was given the mass to harden, when we cut away the dam, and finished this combination filling with wet corundum and dry paper disks, as in a commonplace gold filling. This we have seen within a month, and voted it a success. It proved a clever way out of a difficulty. Except in making repairs in gold fillings, we have small use for gold and cement combined in this way ; but it has expanded into a most excellent practice with tin and cement, also tin and gutta-percha, as already detailed.

Like others, we have had trouble in keeping temporary molars, likewise sixth-year molars of children, in good condition with cement alone, and in these cases tin imbedded in oxyphosphate seems to fill the traditional long-felt want. Its introduction forces the cement into out-of-the-way places, leaving exposed to attrition a material capable of withstanding any amount of juvenile grinding. We have used the tin in combination with cement in the form of heavy foil squares, also hard rolled cylinders afterwards much flattened. Very heavy foil or the lightest of sheet tin used in the laboratory, answers better than the ordinary book foil, cylinders of which are apt to drag and tear with the phosphate adherent to the instruments.

In cases where, as a rule, cement alone is used, as in approximal cavities of molars and bicuspids opening on the grinding-surface, the combination in question seems to be particularly useful. Here the weak part, from a mechanical standpoint, is the angle restored or contoured by cement. This breaks off, rounds up, favoring further wear and the accumulation of food between the teeth. When filled with squares of tin imbedded in cement this angle is preserved, and very much longer than even with tin of old form alone.

Combinations of cement and tin—or gold—are also useful in effecting repairs, as in one of a number of cases we now call to mind. Decay had traversed a fissure, reaching and partially undermining a large approximal gold filling, as good as on the day of its introduction. To remove the filling was to trespass on righteousness ; to follow up the decay for the purpose of paving the way for an all-gold repair was to destroy its anchorage. Therefore excavators were used, the decay removed, soft cement introduced, followed by a few small pellets and thinly flattened cylinders—all imbedded in the cement, on which the mass depended almost wholly for its retention. The result was such as to give no clue to the method employed in its production.

Again, in the large contour work of central incisors we now and then meet with spaces between the tissue and fillings, usually at the cutting-edge and V-shaped ; and as the filling is dependent on other and stronger parts of the tooth, it is therefore firm. Repairs in these cases may be made by filling, but this is sometimes risky and the result apt to be patchy. The better way is to cement into these places a bit of fine gold plate, finishing when the cement is hard, flush with the tooth and filling. This is far from new, but has a place among the combinations in question.

A word or two in regard to the material. The tin should be chemically clean,—that is, free of grease from rolls and hands ; and this is best effected by means of one of the caustic alkalies. It should be roughened by scoring with sand-paper, or squeezed between two sheets of the same ; or, better still, perforated by means of the ordinary plate punch. It may be used in cement without further preparation, but with gutta-percha it should be alternated, several layers of each to the sheet, and cut into squares before it is introduced into the cavity ; or the tin may be coated with chloro-percha, or a thin chloroform solution of Canada balsam, and then disposed alternately with the gutta-percha in the cavity.

PROCEEDINGS OF DENTAL SOCIETIES.

ANNUAL CONVENTION OF THE FIFTH, SIXTH, SEVENTH, AND EIGHTH DISTRICT DENTAL SOCIETIES OF THE STATE OF NEW YORK.

(Continued from page 58.)

DR. A. L. BENEDICT, of Buffalo, read a paper entitled, "The Mouth and Connecting Cavities in Relation to Speech." The paper covered very completely the subject indicated by the title. It was a full description of the vocal sounds, their nature, and the mechanism of the organs of speech in their production. The limited space at our command precludes its publication, inasmuch as it had but an indirect dental bearing.

Dr. C. W. McCall, of Binghamton, read the following paper on

MURIATE OF COCAINE CRYSTALS AS AN AID IN REMOVING PULP.

The busy dentist often finds it necessary to extirpate a live or partially live pulp, when for various reasons the operation cannot be postponed to a future sitting, as would be the case if an application of arsenious acid were employed.

It not infrequently happens that for crowning or other purposes we are compelled to remove a live, healthy pulp at once, or perhaps a tooth when first presented may already have been treated with arsenic, and after removing the coronal portion of pulp the canal portions are found to be still highly sensitive. The second application of arsenious acid in this particular case may be impracticable.

The same annoyance is experienced when after removing the bulbous and perhaps part of the canal portion of a gangrenous or suppurating pulp, the apical end is found alive. In any of these cases the operator as well as the patient shrinks from the attack. But its immediate removal seems imperative, and some very heroic operating must be done which few patients have the physical stamina to endure without the aid of a suitable obtunder; and if any agent can be used which will in the least alleviate this ever-dreadful ordeal, its employment is clearly indicated.

The use of cocaine as an obtunder of sensitive dentine and its discouraging results is so emphatically a "back number" that I fear the bare allusion to this alkaloid will draw a smile of incredulity from many who have, as they believe, a well-founded prejudice against it. Its superficial application to the live pulp in the various per cent. solutions has not been effective in my hands, and while no claim of infallibility is made for the use of crystals, their easy and painless application and usual efficiency is the excuse I offer for relating my own experience with this really practical method of eradicating live pulp-tissue, which in twenty-five out of probably thirty cases has been an invaluable aid.

Assuming that the pulp to be operated upon is fully exposed, either through the action of caries or artificial means, the careful placing of a crystal of cocaine against it will cause not the slightest pain if applied with a stiff probe, the end of which is just moist enough to cause a crystal to adhere.

Almost immediately after withdrawing the probe the crystal dissolves, owing to the natural moisture of the pulp, and in a moment, more crystals are placed in contact with the now obtunded pulp-surface, free access to which should now be obtained by a few careful draw-cuts with a small hoe or spoon-shaped excavator.

The probe should then be exchanged for one with a thin, slim neck and sharp point, which after being bent to the proper angle is cautiously introduced through the orifice and around the sides of the coronal portion. In some cases the patient will experience pain as soon as the probe is introduced into the pulp, in which event more crystals should be added and a moment or two allowed to elapse, when a second trial should be made, and as soon as the patient evinces no pain the probe is slowly worked up and down, making different tracks through the bulbous portion,—thus injecting the concentrated cocaine through every part. In from one to five minutes all the coronal portion may be scooped out with a spoon-shaped excavator. After wiping out the *débris* the root-contents may still be found sensitive, and in order to obtund this always troublesome portion of the dental pulp it is necessary only to follow the same insinuating process that has been described with reference to the coronal portion. And this applies as well to pulp which has been only partially removed through the aid of arsenious acid, after which it may be extirpated by any of the well-known methods.

In single-rooted teeth this insinuating process may usually be carried throughout the root portion, being careful to convey the probe around outside between the pulp and canal wall first, and then gradually through its entire substance.

In conclusion, I believe that this method of using cocaine has saved patients much suffering at my hands, which was formerly unavoidable, and has simplified an operation which at times seemed to baffle my best efforts, with a consequent loss of time and much energy.

Discussion.

Dr. A. Ritter said his practice was to take a small particle of nerve-devitalizing fiber and roll it in crystals of cocaine. He then seals it up with gutta-percha, never with sandarac and cotton, and leaves it for one to two days, and in every case there is no pain. At the end of this time the nerve is almost always dead ; if it is not, he repeats the application. He is careful to open the pulp as fully as possible without causing pain before the application is made.

Dr. M. B. Straight thought the essayist had given a very practical way of removing the pulp ; did not think there was any better agent for the purpose than the cocaine, used as described in the paper.

Dr. McCall closed the discussion by thanking the members for their favorable reception of his paper.

SECOND DAY.

The clinics were held at the rooms of the Buffalo Dental Manufacturing Co., and were well attended, the rooms being crowded.

Dr. Geo. Evans prepared and placed seamless gold caps on two superior bicuspids.

Dr. A. M. Wright demonstrated a method of filling with amalgam at the cervical border of the cavity, and finishing with gold at the same sitting.

Dr. F. E. Howard showed his process of capping an exposed pulp.

Dr. R. H. Hofheinz demonstrated the Williamson electric dental engine.

Dr. Theodore G. Lewis showed several kinds of recently invented dental laboratory apparatus.

Afternoon Session.

The convention was called to order at 2 P.M., President Low in the chair.

A communication was read from the Fifth District Dental Society, saying that they did not think it expedient to continue to meet with the other societies in joint convention.

Dr. W. C. Barrett read a paper, of which an abstract follows, entitled

EXAMINING BOARDS *versus* DENTAL COLLEGES.

Dr. Barrett in his remarks introductory to the subject disclaimed any thought of individual censure or personal reflection. He had always been a persistent critic of the schools and had openly attacked their shortcomings, but when he saw that these were amended and that the colleges were advancing as fast as professional opinion would permit, that the present system was fully up to that of other professional and literary schools, he gave them credit for what they had accomplished. His strictures were prompted by an honest love for them and a desire to advance the cause of education, and not by any sense of prejudice or jealousy.

After giving a historical sketch of the educational methods in vogue during the early days of dental colleges,—a period which was characterized by the conferring of honorary degrees on a large number of respectable practitioners in order to popularize the then new dental degree,—he called attention to the fact of its abandonment, as it had served its full purpose, and its continuance would necessarily be fraught with evil to the profession, as the principle upon which it was founded made the faculties of various institutions the supreme judges of qualification to practice, and under its working the requirements had become less and less stringent until it culminated in the Delavan fraud of Wisconsin. The faculty of that institution firmly believed in "recognizing knowledge whenever and wherever obtained." The degree of Doctor of Dental Surgery fell into disrepute in foreign countries, because it was so promiscuously conferred. Foreign dentists of repute refused to fraternize with the graduates of American colleges. The very means that had been primarily employed to make the degree popular now operated to condemn it.

The editorial department of the *Independent Practitioner* asserted that colleges were not organized for the granting of degrees. Their business was to teach. They had no more right to "recognize knowledge whenever and wherever obtained" by the granting of a diploma upon a mere examination, than they had to pronounce upon the qualifications of clergymen or lawyers. Their sole duty was to conduct students through a prescribed curriculum of study, and this accomplished, it was proper to give them a certificate of the fact. The college diploma was just their certificate that a regular course of study had been pursued, and it could be no more. The schools could not, with any degree of propriety, attempt to pronounce upon the qualification of any student, aside from the fact that he had finished a definite course of study.

Being fully satisfied of this, the journal bitterly opposed the acceptance of any term of practice as equivalent to a term of school. Twenty years of reputable practice had at first been accepted in lieu of a year's tuition. Then twelve years was deemed sufficient. This soon sank to five years, and finally the most of the schools were practically graduating students upon the mere statement that the candidate called himself a respectable practitioner, and upon his nominal attendance upon one short course of lectures. The editor had been for some time accumulating evidence that some of our most reputable schools were making the attendance for the one winter a mere matter of form, and when he was properly loaded the fight began by the publication of an article attacking the oldest of our colleges for graduating some of the most reputable practitioners in America upon a mere examination. It was thought that we might as well begin by aiming at the head. Nothing could be accomplished by charging upon those schools that had little of reputation anyway.

Advantage was taken of a clause in the Dental Act of the State of New York, which prescribes that a college must be recognized as reputable by the State Dental Society before its diplomas shall be accepted as a legal qualification. Charges were preferred against this same college for graduating students without attendance upon its full curriculum, and it was summoned to show cause why its name should not be stricken from the roll of reputable institutions. This was done, not in enmity to the college, but because a broad principle was involved, and the right or wrong of the matter could be best established by commencing at the top instead of the bottom.

The dean appeared at the stated time before the Dental Society of the State of New York, and showed that the school had been but following an old and well-established practice, one that most of the schools accepted. It was with the utmost difficulty that some of those now present were held in line, and prevented from quashing the whole proceedings by their votes. They did not fully comprehend the breadth of the attack that was made, and regarded it as the outbreak of a prejudice against our oldest dental college.

But the dean frankly acknowledged that the college had become satisfied that the practice was an evil one, and they were but waiting until they could with propriety revoke the offer to so confer diplomas, and that the grand old school did not propose longer to postpone a step in advance. Upon this, it was moved that the State Society express its entire confidence in the college, and pledge itself that it would very heartily support it in the new departure. From that time to this the college in question has been foremost in the work of reform.

The college which had been summoned before the New York State Dental Society, true to its enunciation of principles, took the initiative in organizing an association of the faculties of the best schools, and in raising the standard of graduation. It was discovered that all the colleges were sick and ashamed of the then lax condition, but that each was afraid to inaugurate a new system, because they had little confidence that the sentiment of the profession would sustain them, and feared that all the students would go to the institution which granted its so-called honors upon the easiest terms. Every inquiry from proposed matriculants was as to how quickly and with how little knowledge one could receive a diploma. It was the degree, and not education, that men seemed to seek. But a solemn agreement was entered into by the leading schools, that diplomas should only be conferred in full course.

The colleges having plainly evinced a desire to advance their own status, it was time to call off the dogs, and since then it has been mainly the puppies who have continued the war.

The compact entered into by the colleges has not only been respected by nearly all the schools, but the standard has been continually raised, just as fast as the sentiment of the dentists as a whole would permit. In fact, the Association of College Faculties is becoming a rather radical body. They have gone too fast, in the estimation of many. The term of pupilage has been extended, and the semesters have been lengthened. With this present term they open an obligatory course of three years instead of two, and of five months in place of three, while nearly or quite all of the best of them demand an attendance of seven months at each term. Already they are moving to make this nine, while a number of colleges have practically a school term of twelve months in each college year. At the last meeting of the Association of College Faculties, a resolution was introduced looking toward the extension of the term of pupilage to four years, instead of the three upon which they were just entering.

The granting of honorary degrees has been practically abolished. No college can confer a diploma, except in course, without first obtaining the consent of all the other schools in the association. Students must be in actual, daily, faithful attendance upon college lectures during the whole term of pupilage, or they are debarred from coming up for graduation. Any student who is twenty days behind in his attendance forfeits his privilege of examination. He must be as faithful in the laboratory and clinic rooms as in the class-room. Every hour of every school day must be strictly accounted for. A daily roll-call, at both lectures and clinics, is insisted upon. A graded course has been established, and the students divided into freshman, junior, and senior classes. The curriculum has been greatly extended. More teachers have been added in all the schools, and wonderfully increased facilities provided.

A graduate of fifteen years ago would now scarcely recognize his *alma mater*. The proportion of plucked or rejected men is constantly increasing. Entrance and passing examinations of a continually augmenting stringency are provided for. Every school is held to a strict accountability by its associate schools, for they keep a close watch upon each other. This responsibility of each college to all the rest covers not only its manner of teaching and of granting diplomas, but its discipline and internal regulation as well. At the last meeting of the associated faculties one school was suspended from membership for a period of two years, because it had conferred a diploma upon a student who had not been faithful in a full attendance upon college lectures. This suspension is a serious matter, for it means that no college will receive a student from it or dismiss one to it, nor will its diplomas be recognized in any manner. The discipline must be effectual, unless the examining board of the state in which the school is located overrides the decision of the Association of College Faculties, and permits its graduates to enter upon practice notwithstanding the irregularity.

All this has been accomplished in seven short years. Order has come out of chaos, and the complaint among those most concerned now is that the difficulties attendant upon graduation have been made too apparent, and that qualifications that are unreasonable are now demanded. In fact, there is grumbling that it is now too difficult to obtain a diploma, especially upon the part of those old practitioners who are without any degree, and who claim that the schools should "recognize knowledge whenever and however obtained," and "place the proper stamp upon merit," they themselves having a rather clear idea as to where such knowledge and merit can be found.

The men who made the fight in the first place, and who may conscientiously claim to have had something to do with instigating the wonderful progress, are not now found among the howlers at the schools. They have watched the workings of the new order of things too closely not to be satisfied with the rate of advancement, and to recognize the conscientious efforts of the schools for a better state of things.

The colleges are yet a long way from perfection. There is plenty of room for improvement. But the great reforms wrought within the past seven years, and the present continued rate of advancement, should bring immunity from the charges that they are conducted simply for pecuniary profit and without a due regard for the best interests of dentistry. Indeed, it is not at all certain that dentists will sustain and support the colleges that are engaged in raising the standard. The schools outside the college association are meeting encouragement in quarters where this should be least expected.

The organization of dental examining boards was but the natural outgrowth of the old methods of granting degrees. When the schools were graduating men upon a mere examination, and that too often but a pretense, there was an importunate call for some authority to scrutinize the work. Influential men in certain states secured the passage of laws authorizing the appointment of dental examiners, and in some instances these laws made such a board the supreme authority to regulate the practice of dentistry, utterly regardless of the only possible source of instruction.

Sometimes—by far too often—these boards were composed of men who had never attended a dental school a day in their lives. But they were men of experience and self-acquired knowledge. They knew nothing of the methods of the schools, but they knew what a dentist ought to be in daily life. They were ignorant of theory, but they knew practice. Their power was a wholesome check upon the schools.

Naturally this has caused irritation. The college faculties have doubted the ability of some of these men properly to conduct an examination of college graduates upon subjects with which the members of the board are not acquainted, and have asked that in case of the rejection of a graduate a list of the questions and answers should be furnished the school implicated. Of course, if the questions were fair ones and the candidate actually exhibited ignorance of that in which he should have been instructed, it would be a deadly blow to the college. One would have thought that this opportunity to smite the schools would not have been refused, but instead of the granting of the request a rather disdainful answer was returned, and the colleges were informed that they had no rights in the matter.

Thus a breach has been formed that is constantly widening, and that promises only evil to dentistry. There is a necessity for examining boards, and most certainly the colleges are essential. Let it not be forgotten that there is no other source of instruction. Examining boards do not teach. They only find fault with those who do teach. So far as education goes, they only sit in the breach and throw clubs. They give the students nothing, and if they but drive them away from the only source of instruction, in what way are they a benefit to dentistry?

The amount of the matter is, there is a great misunderstanding of the functions of a college. The schools cannot make dentists. They cannot impart brains or "gumption." They can do nothing but teach, and if a student is not disposed to learn they cannot do even that. Their business is simply to offer opportunities for obtaining an education. They can only lead the pupil through a specified curriculum of study, and when he has mastered that certify to the fact. If he has not the mechanical ability to make a pig-trough, they cannot impart it. They can teach him the theory of dentistry, and practical mechanics, but they cannot convey the ability to make a diagnosis.

But it may be answered that a student should not be accepted if he has not sufficient ability. What standard of talent shall be established, and who shall determine it? Should the common schools be closed to children who do not come up to some fanciful line of intelligence? The usual theory is that the greater the lack of brains, the greater the need for schooling. It is quite impossible for the dean of a college to determine who, out of some hundreds of proposed students, has all the ability requisite to make a first-class dentist. The dean must receive a hundred men in two or three days. He does require that the applicant shall present evidence that he has a fair education,—enough to enable him to comprehend technical studies,—but mechanical and professional ability can only be determined upon an extended trial. Once having matriculated, the student has the right to pursue his course to the end, and if he can then demonstrate that he has been taught the things essential to know, he must receive the certificate to that effect.

All these things should be taken into consideration by the boards of dental examiners, and they must try to work in harmony with the schools, or they will certainly go to the wall. Colleges are an absolute necessity. There can be no education without them. Examining boards have important functions, but let it not be forgotten that they can only live in the presence of the colleges, and that the sole reason for their existence is that they may assist the work of the schools by insisting upon the thorough professional education that is provided only by the schools.

If students who have gone through the full curriculum of any recognized college are to be examined by a state board, it should be before their graduation.

In the State of New York, no diploma is a sufficient qualification for practice until the school that granted it has been duly recognized by the State Society, acting through its board of censors. It is the duty of this board very carefully to inquire into the methods of teaching, the equipment, and the general conduct of any school, and having determined that it is doing faithful, honest, legitimate work, it is placed upon the list of recognized schools, there to remain so long as it is worthy of recognition. If at any time it prostitutes the power granted it, the society may, as it has done before, summon the school to answer any charges preferred against it, and if these are established it can be stricken from the list, and henceforth its diplomas are not worth so much as the paper upon which they are written, so far as this state is concerned.

That is the correct principle. The examining board should hold the colleges to a strict accountability. But to make no discrimination between the good and the bad, to condemn all alike and unheard, is to place a premium upon ignorance and dishonesty. It is to discourage education and to debase our calling to the level of a mere trade. No man will enter a college door when he is virtually informed by those to whom he looks for ready-made opinions that the diploma means nothing, that for his three years' time and his hundreds of dollars expended he has nothing of value to show, and has not advanced himself in the estimation of those who should be the best qualified to judge.

No one who is fit for the position will become a teacher, if he is to be but the target for abuse and misrepresentation on the part of those who should stay his hands, and if he is to be charged by those who call themselves honorable men with being a cheat and a fraud. Our schools must be sustained if we are to maintain an honorable status among the callings of the world. Without schools and without a literature, dentistry will lose the honorable position it has gained.

A letter from Professor J. Foster Flagg was read upon the subject of Dr. Barrett's paper, taking exception to the title, "Examining Boards *vs.* Dental Colleges," as expressive of an antagonism which should not exist, inasmuch as they are both factors in the educational process of dentists and should therefore work harmoniously to that end; for "it is upon education that the highest hopes of the human race are based. It is the perfecting, or at least the improving, of educational work which is the grandest problem of our day. It is a task which is truly Herculean, and which therefore demands the most conscientious endeavor and the most united effort.

"That good may be the outcome of this work is my sincere desire, and it is to this end that I give you as my 'sentiments,' 'Examining Boards AND Dental Colleges.'"

At the close of the reading of Dr. Barrett's paper Dr. C. S. Butler read letters from Drs. E. T. Darby, Frank Abbott, C. N. Peirce, and W. X. Sudduth, expressing their ideas on the subject.

Discussion.

Dr. C. S. Beck, being called upon to open the discussion, said he thought he could claim to know something of examining boards, as he had been a member of the examining board in Pennsylvania for nine years. "Early in the history of our board the question came up as to what should be the quality of the examination, and it was agreed that it should be much more stringent than the examination in any dental school, and this has been our practice ever since.

"It is hoped that the present law will be amended so that all who enter the practice of dentistry will be required to have diplomas, and that every diploma shall be indorsed by the examining board. For the last three years our board has not granted a single certificate. The remark has been made that the colleges are instituted for the purpose of imparting instruction, and that they should be best able to judge of the acquirements of those who have passed the required qualifications for practice." He thought that the colleges should impart the instruction, but that the final examination should be made by some body outside the college. Examining boards, however, could not be considered as antagonizing colleges; they sent to college many students who would otherwise not have gone.

Dr. W. W. Coon said that it was not, in his opinion, proper or just that the examining boards should take from the colleges the right to certify that the student had passed a proper examination and that he was legally qualified to practice. The college diploma should be legal evidence of the right to practice, but the college examination should be open to the oversight of a committee of the societies.

Dr. Jonathan Taft said the paper was one of great interest to all dentists, and especially to those who had had to do with educational matters and those who occupy positions as dental examiners. The opinions expressed here have not been so diverse as those expressed elsewhere, and as we come to a fuller understanding there will be less and less of diversity of opinion. It has been said that colleges were instituted for the purpose of imparting knowledge. This is true, but it is not true that they should go no farther. The giving of honorary degrees is something all colleges have done in the past. Degrees in law, in divinity, and of all kinds have been conferred by the most dignified institutions of learning all over the world. It is a valuable privilege, but liable to abuse. It is a recognition and proclamation of attainment. The dental colleges have sometimes abused this privilege, and now it is abandoned. We will not censure those colleges which followed this custom years ago, as it was necessary then from the circumstances of the case. The degree was a new one, and unless the better class of practitioners gave it their countenance it would never be known and valued, and, besides, they followed the custom of the older institutions of learning. Some received these honorary degrees who did not deserve them, and the practice has been abandoned.

Many criticisms have been made on examining boards. These boards are the instruments for the execution of laws which have been passed by the different legislatures, invariably by the exertions of dental societies. In the beginning these laws were very defective, but have been improved from time to time, until we think they are about right. Now, how should these laws be executed? Who is to see they are obeyed? For this work the boards of examiners were appointed. They are officers of the law, to see that the law is carried out. They were appointed in different ways, and they seek to fulfill their duties as well as officers of other kinds. They have considerable power, and exercise it usually as well as others in power.

A little friction recently occurred between certain college officers and certain examining boards. It is now all cleared away, and will not occur again. The two parties are working for the same end. Nobody denies that the enactment of laws and their enforcement has vastly improved the colleges, sent hundreds of men to college who would never have gone there, and raised the standard of educational requirements in all the colleges.

Dr. Barrett said the examining boards were necessary and had their function, but have in certain cases exceeded their duty. The colleges, too, know that they have neglected their duty; their standard was too low; but now it has been so elevated that it is almost out of the reach of the best of us. What is complained of is that the examining boards do not discriminate between the good and thoroughly-equipped schools and those which are not so. The examining board should examine the student before he graduates, and let him know whether he is fit to hold a diploma, but when the diploma is received we must respect it. And he would have the examining board accept diplomas from schools that have established reputations and that have been examined by the board.

The examining boards are a necessity, and the schools, too, are necessary, for no other way is given under Heaven by which a man may get a dental education.

Honorary degrees were at first given out by the bushel, because the degree was unknown; but now that the degree is established, and there is no reason for the honorary degree, it has been abandoned. A diploma is a certificate of study, and should be nothing else, and when an institution grants a diploma without the study it goes beyond its proper power.

Dr. W. H. Bergtold read a paper on "The Mouth as a Center of Infection."* There was no discussion.

(To be continued.)

JOINT UNION MEETING OF THE NEW JERSEY AND PENNSYLVANIA STATE DENTAL SOCIETIES.

(Concluded from page 64.)

Discussion upon Dr. Jack's Paper on Pulp-Treatment.

Dr. W. A. Conrad, St. Louis. I would like to ask Dr. Jack if I understand him correctly when he says that he examines his cases one, two, three, or four times a year.

Dr. Jack. Yes, sir.

Dr. Conrad. Now, I would like to ask also what is the cause of pulp-exposure in your practice.

Dr. Jack. The causes have been various. I have had repeated instances of finding the pulp exposed in comparatively small cavities.

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*See page 120, current number.

I do not consider that five hundred cases in a period of fourteen years is a large number.

Dr. Conrad. I would like to ask also what do you call an exposure in those five hundred cases.

Dr. Jack. An exposure I so consider when it is actual, not approximate.

Dr. Conrad. You also spoke in relation to a layer over the exposed pulp, so I suppose if there was a layer over it there was no actual exposure in a great many cases?

Dr. Jack. You have misunderstood my statement. I have said, where I had reason to believe the pulp was exposed, I immediately removed the entire carious matter as a matter of safety, so a large majority of the cases I have reported to you are not approximate or probable exposures, but actual exposures that have occurred in that period of time.

Dr. Conrad. The gentleman in his paper quoted from an article in the "American System of Dentistry." Now, those who have read that work will find there in two places two opinions, one of them claiming that any irritation of the pulp which will produce a deposit of secondary dentine, or, as I call it, calcification, will produce its death. In a practice of several years it has been my pleasure to attempt the capping of several pulps. In recent years I have been devitalizing the pulps of some few teeth, and I found in a number of cases there had been calcification, a great many more than I imagined, and it is my opinion wherever we have calcification, or any deposit which produces irritation, we will eventually have death of the pulp; and unless we can get some line of treatment or practice whereby we can avoid producing irritation and calcification, or deposit of secondary dentine, we will in a shorter or longer time always have death of the pulp following.

Dr. G. W. Klump, Williamsport. Some years ago I wrote a paper upon this subject, and I took a different ground from a great many in not leaving disintegrating dentine over a pulp when I had any reason to believe it might be exposed beneath it. In my practice I entirely coincide with Dr. Jack. I think a great part of the loss of pulps that are supposed not to be diseased comes from not uncovering them thoroughly. When you come to remove this disintegrated dentine you will find they have probably receded, and the pulp-chamber is not entirely filled up. The pulp will not tolerate a vacuum. If there has once been disease or inflammation to that extent, and a recession, I think there is likely to be disturbance, followed by disease and death. But I believe we save a large percentage of the pulps we cap.

A paper was read for Dr. Henry Leffmann by Dr. A. P. Brubaker, on the subject

Some of the Methods and Results of Bacteriological Work.

It is the purpose of the present contribution not to argue vexed questions of pathology or bacteriology, but to exhibit to this meeting some of the actual results and the methods by which they are obtained.

It is proper to say that my own interest in the subject is practically restricted to the biological and chemical relations, and that with the purely pathological I have but little experience.

The existence of minute forms of life more or less intimately associated with putrefaction and fermentation, even with disease, has been known for a considerable period. More than two hundred years ago Leeuwenhoek, a Dutch naturalist, described and figured several forms, among which was a characteristic spiral form found in the mouth. He also recognized a close relationship between some of these forms and common decompositions of organic matter.

Advance, however, in knowledge was slow, due largely to the want of investigation. The minuteness and simplicity of the various forms rendered it necessary to employ optical apparatus of high magnifying and excellent defining powers, and when these aids were attained, it was still impossible to differentiate forms accurately, as under one designation several distinct species might be included. Thus the rod-like forms occurring in ordinary decomposing organic matters were grouped under the general title *Bacterium termo*, a term which is still supposed by many to comprehend the species causing putrefaction, but in reality several distinct species are concerned in such changes, and the term has no scientific value.

The advances of the last fifteen years have not been due solely to improvements in lenses, but to the introduction of two accessory methods, for the invention of which we are largely indebted to Koch. It is proper, I think, to remark here that while we can scarcely overestimate the service which the distinguished Berliner has rendered to science, we must regret that he has perhaps unduly but unintentionally overshadowed another worthy worker, Pasteur. The fundamental principles of the science were elucidated by the French scientist, but the greater practical value of some of Koch's results and the aid of the ingenious methods of investigation have lent an exceptional briliancy to the German worker.

The practical aids to bacteriological investigation are the employment of staining fluids and of solid culture-media. By the application of the former, species that are similar in form, size, and habit of growth may be accurately distinguished. These staining-fluids are mostly aniline colors. Among the applications of this method may be instanced the distinction of the *Bacillus tuberculosis*, which can be stained of a special color, and thus not only brought out prominently among the tissues of the organ under examination, but distinguished from other organisms which resemble it in form but do not take the stain or do not retain it. The second method of research is the employment of gelatinizing culture-media. A nutritive medium, generally meat-broth, with peptone, is mixed with about 10 per cent. of gelatine, which causes it to solidify on cooling. If the mass be melted at a low temperature, a small amount of any fluid containing a miscellaneous collection of micro-organisms added, thoroughly mixed, and then allowed to solidify, each individual organism will become a center of development and form a colony of its own kind. Thus, organisms too minute to be seen, except under high magnifying power, will gradually form a mass visible to the naked eye, a portion of which may be transplanted to new soil and distributed in the same manner. By this means, sooner or later, a so-called pure culture will be obtained; that is, a colony consisting of a single species.

A modification of this method is described by Dr. Miller, in his work on "Micro-Organisms in the Human Mouth." This consists in pouring the melted mass of sterilized culture-medium on a flat plate, allowing it to harden, and then taking up on the point of a wire some semi-solid mass containing micro-organisms; the wire is drawn a number of times in parallel lines over the surface of the medium. The attached material is gradually distributed, rather thickly at first, but gradually thinning out so that the last lines will show very distinct separation. Such a method is peculiarly suitable for differentiating the micro-organisms of the deposits around the teeth.

The most interesting advances in knowledge in this field have been not so much the identification of species, as in the recognition of the chemical actions brought about by the growth of micro-organisms, especially in the decomposition of albuminous matters. Some of these facts have been known for years, without the exact relationship and bearing having been suspected. Thus it was discovered more than a generation ago that ordinary putrefactions develop, in addition to the offensive gases, crystallizable bodies of definite chemical character, and that when putrefaction is allowed to go on, especially with free access of air, the final result is the formation of ammonium compounds and nitrates. By patient investigation, many of the intermediate compounds have been isolated and found to be of basic quality,—that is, resembling such substances as morphine and strychnine, though generally more easily decomposed. From their association with dead and decaying material these basic bodies were called "ptomaines," from a Greek word meaning "corpse." Research, however, has greatly added to the number of classes of substances that may be produced by such decomposition, and we now know that every one of the great groups of organic bodies may be produced in these decompositions. Now, it has been established beyond doubt that all such decompositions of albuminous bodies that take place under natural conditions, that is, the so-called "spontaneous" changes, are due solely to the growth of micro-organisms, hence it follows that the products of the decompositions are merely the secretions and excretions of such micro-organisms. Artificial distinctions that have but little scientific value have arisen in consequence of the ignorance of the real nature of such decompositions. Thus changes attended by markedly offensive odors are generally known as putrefactive changes, while those not so characterized are called fermentative changes. The distinction, however, principally arises from the nature of the material operated on. Since this chemical question has a direct bearing on dental pathology, we may discuss it more in detail.

All our knowledge tends to indicate that no vital action exists without the presence of nitrogen, and probably also of phosphorus, the latter in the form of phosphates. No non-nitrogenous body can, therefore, alone support life or produce tissue, but such bodies may incidentally contribute to vital action and constitute food. Thus the fatty and starchy matters which we take into our system cannot certainly form our tissues, since they are all nitrogenous and phosphatic, but the carbon, hydrogen, and oxygen in such foods may be utilized either as a source of energy or as a contribution to such tissue-building. Micro-organisms are but an epitome of the human being.

Commonly considered as vegetable, they have some chemical and physiological functions which ally them to the animal kingdom, among which we may mention their power of consuming directly nitrogenous food. Now such micro-organisms growing in water, soil, and other places, in scanty or abundant supply of nitrogen, as the case may be, can use up as food non-nitrogenous articles. Both classes of food once consumed are chemically changed and the products excreted. Since nitrogen, when not in an oxidized condition, has distinct base-producing power, we are not surprised to find that the products of decomposition of albumin, fibrin, etc., are the bases heretofore called the "ptomaines." The sugars and starches, containing no nitrogen, cannot give rise to basic substances, but are excreted in various oxidized forms as acids, alcohols, or other bodies. Common alcohol, for instance, is produced from sugar by the growth of microscopic plants, which doubtless feed on the sugar and, splitting it up into carbon dioxide and alcohol, excrete both those bodies. Although in such cases we overlook the nitrogenous part of the experiment, yet the yeast-plant cannot grow in a medium absolutely free from available nitrogen. Further, alcohol may be converted into acetic acid by the action of a certain micro-organism, and lactic, butyric, and other acids may be formed from the same source. We have here a simple explanation of the chemical process by which the acids are formed in the mouth; micro-organisms are found abundantly in that cavity, and a supply of nitrogenous material and phosphates is always at hand; the temperature is favorable to the growth of many species, and hence an active development takes place. Now if the albuminous matters were alone concerned, the products, though offensive in odor, and possibly somewhat irritating, would have but little effect upon the enamel of the teeth, since they would not be acid, and hence produce but little decay; but the forms of sugar or starch which also exist in the mouth are brought into the cycle of changes, and acids are formed, especially lactic, by which the tooth-enamel is corroded. In this primary effect the tooth takes only a passive part, but when the dentine is exposed, its organic nitrogenous matter, losing its vital resistance, succumbs to the influence of the micro-organisms and becomes invaded by them. This is the simple story of dental caries, for the elucidation of which we are so largely indebted to Dr. Miller, of Berlin.

Another class of products arising from the action of micro-organisms has been made known, but information is still very incomplete. It has been shown that many species, probably all, secrete digestive agents by means of which they transform the ingredients of the medium in which they grow into compounds suitable for assimilation. Thus the yeast-plant secretes a substance which has been called "invertase," and has the power to convert cane into grape-sugar. Other digestive agents have peptonizing power.

It is not appropriate here to speak at any length as to the classification of micro-organisms, but I may say the entire group is now generally classed under the term "microbe," and that subdivisions have been made, based on the form of the individual. Thus we have the rod-like form, called "bacillus;" the spherical form, called "micrococcus;" the spiral form, called "spirillum."

This arrangement is very unsatisfactory. A natural classification must be based on the methods of reproduction, and must show the relationship by descent if possible. The forms are, however, so minute and simple that up to the present time such a classification cannot be attained. For my own part, in view of the uncertainty, I would prefer to discard all subdivisions and provisionally include all the forms under the general term bacterium.

Discussion.

Dr. Domingo M. Sabater, New York. At one of the last meetings of the New Jersey State Dental Society, I was honored by being asked to take part in the discussion of the paper which Dr. Henry Leffmann, of Philadelphia, was to read before these societies. It was a surprise for me to hear such an unmerited selection, and although not possessed with the ability, but at least with the best feelings and wishes, I consented to do so at the time. Now to fulfill my promise, and in response to the essay, I must say that I do not think there is much in its contents for discussion, as almost every point in it is based on fundamental principles which practical experience has proven beyond doubt. The doctor dwelt, as he says at the beginning of his paper, "strictly on biological and chemical relations," which leave no chance for debate. I will only take exception to some points.

In years past we used to say that "Mathematics was the truest science," but at the present time we can safely add that we have another nearly as true : this is Microscopy. By the aid of the latest methods and preparations, and a good microscope, we can invariably detect the smallest form of micro-organisms and their different classes. The microbe theory is not unknown to science, as it can be traced as far back as the middle of the first century, when a faint idea of it was conceived, but unfortunately not properly investigated, and left in darkness until the seventeenth century, when Anthony Van Leeuwenhoek, as it has been stated, had the glory of discovering the presence of microbes in the oral cavity. Then at the beginning of the present century different investigators placed this theory on a more solid scientific basis. Since then it has been daily advancing, till we hear in relation to it among others the immortal names of Pasteur and Koch.

Lately the improvement in the mechanism and lenses of the microscope, and other necessary auxiliaries, as the condenser, or illuminating apparatus, due to Abbe of Jena and to Ziess, has been to the medical and dental practitioners their best gift, companion, and support. We will not forget, as the essayist also states, the late advancement in the preparation of specimens. The two methods he mentions, consisting of the staining process, or "micro-chemical reaction," so called, due to Koch, Weigert, and Ehrlich, and the solid culture-media, are in my humble opinion the strongest bases for practical bacteriological researches.

We are grateful to Dr. Leffmann for stimulating in us the desire of investigation in bacteriological and microscopical work, and we will not forget that the latter has been advanced also for the last twelve years by Professor Carl Heitzmann, of New York.

Now, Mr. President and gentlemen, I beg to make a few remarks on the paper read before you. The doctor, in speaking of the staining-fluid methods, says, "By the application of it, species that are similar in form and habit of growth may be accurately distinguished." He mentions an instance, "the Bacillus tuberculosis, which can be stained a special color and thus distinguished from other organisms which resemble it in form, but do not take the stain or do not retain it." To this permit me to add that the bacillus of leprosy, discovered by Hansen and Neisser in 1880, has the same form, size, and appearance under the microscope as the Bacillus tuberculosis, and although susceptible to the aqueous aniline solution, yet at the same time it takes exactly the same stain and retains it, as Bacillus tuberculosis.

Now, finally, I would like to take an exception to the position assumed by the essayist, "that caries of the teeth is accounted for in such a summary manner;" and as he cites Dr. Miller, of Berlin, I would like to ask permission to quote from this gentleman a few lines published in the DENTAL COSMOS in 1883:

"There is no difficulty in accounting for the source of the acids concerned in the caries of the teeth. The saliva is impregnated with acids in various special and general disorders of the system; acid is brought into the oral cavity with the food and in the administration of medicines; but by far the greater part in the decalcification is to be attributed to those acids which are produced within the mouth by fermentation, viz: lactic, acetic, butyric, etc. A mixture of 68.0 grams of saliva, plus 1.0 bread, plus 0.5 meat, plus 0.5 sugar, kept for forty-eight hours at the temperature of the human body, generated more than sufficient acid to decalcify the entire crown of a molar tooth. Pieces of sound dentine, placed in a mixture similar to the above, became in ten days decalcified to the depth of half a millimeter. . . .

"Do bacteria ever penetrate directly into perfectly sound enamel or dentine, and do they perform any part in the decalcification? I have already referred to the gradual diminution of the bacteria in number, as we go from the outer to the inner margin (*i.e.*, from the surface to the deeper parts of the dentine), till at the inner border but few or none of the tubuli are found to be infected. This fact, which leads us to the conclusion that the micro-organisms cannot penetrate beyond that point to which the tissue has been softened by the action of acids, may be readily confirmed by the examination of the softened tissue taken from different depths of a cavity of a carious tooth. The same gradual diminution in the intensity of the infection will be observed, and at the boundary between healthy and softened dentine it is, with the proper precaution, always possible to obtain dentine which has evidently been subjected to the action of acids, and which yet does not contain any bacteria. . . .

"We come now to the second question: Have the organisms found in and upon decayed teeth the power to effect the decalcification of the same? In reference to this question the following experiments were made:

"1. Pieces of perfectly sound dentine, handled with great care, so as to be kept as free as possible from all foreign matter, were placed in small vials and covered with a drop of distilled water. These were then infected with leptothrix, bacilli, and micrococci from decayed tooth-bone, and kept at a temperature of 35° to 38° C. If now the organisms were capable of decalcifying the tooth-substance, we should expect, first, a softening of the tooth-bone; second, the infection of the softened part; third, an increase in the number of bacteria and cloudiness of the liquid; fourth, since the bacteria could accomplish the decalcification only through the generation of an acid, we should expect an acid reaction of the liquid.

"These flasks were observed for four months. For the first few days an increase in the number of bacteria was apparent, but as soon as all matter upon the surface of the pieces and at the exposed ends of the dentinal fibrils was consumed, the numbers diminished, and at the end of the four months only now and then a micrococcus was to be seen. A cloudiness of the liquid did not occur, an acid reaction could not be detected, nor were the pieces of dentine changed either microscopically or macroscopically.

"2. Similar pieces of sound dentine were kept for the same time under the same conditions, with the addition of several pieces of decaying dentine, so as to insure the presence of great numbers of bacteria. The result was the same as in the first experiment. Microscopic sections failed to reveal the presence of bacteria."

In another paragraph he states, "The invasion of the fungi is always preceded by the extraction of the lime-salts. The fungi have not the power either to penetrate or to decalcify sound dentine."

I would like to state, Mr. President and gentlemen, that the acids produced by the fermenting process, which is said to be carried on by organisms, besides decalcifying the inorganic portion of the tooth, become the irritant of the living matter. This irritation leads to a disturbance of the natural circulation in the nourishing fluids of the tooth, which, together with the said irritation of the living matter, causes an enlargement of the contents of the canaliculi; these enlargements forcing the lime-salts from their organized position, which in time becomes washed out by the acids before referred to. It will be remembered that some observers have taken this position, which I fully indorse: That the deeper portion of the disorganized tooth-substance contains no organisms whatever, nor any acids that can be found by the most delicate test.

This leads me to believe that there are but two essential theories in the process of the caries of the teeth:

1. Chemical. By the action of acids, fermentation causing decalcification of the inorganic portion of the teeth.

2. Pathological. By irritation and inflammatory action of the organic portion.

Micro-organisms only as secondary products.

Dr. W. H. Dwinelle, New York. I congratulate myself with the rest of you that I have another evidence of the superiority of our profession. I congratulate myself with you gentlemen, that the microscope is our special property, that we adopted it early, and that the results that have proceeded from it in our hands have advanced the science of life generally. We have the advantage that our science approaches an exact science. Medicine is continually changing; remedies are continually changing and becoming ineffective. What is substantial and to the purpose to-day, to-morrow becomes inert and ineffective; but in our day an independent science has arisen and become established—the science of histology. Here we are exact as mathematics. We know, from the forms of disease displayed by the microscope, where we stand every time. The forms of diseased structures are exact in their expression. I think we have had a very beautiful exemplification of it in the exceedingly interesting remarks that were made by my friend Dr. Sabater. I rejoice we have young men of his mark soon to fill our places. I think it is a point of special congratulation that we are approaching the exactness of science, where before we were in the dark and the results were uncertain. The science of histology now fills an important place, and is as reliable as mathematics itself.

The standing committees were next announced and the officers for the ensuing year installed, whereupon the meeting adjourned.

OHIO SOCIETY OF DENTAL SURGEONS.

THE Ohio Society of Dental Surgeons met on Tuesday, December 1, 1891, at Hotel Chittenden, Columbus, O.

After routine business and a short address by President E. G. Betty, Dr. C. M. Wright read a paper on the "Soliloquy of a Plastidule." Plastidule means a protoplasmic molecule. "Biologists have reasoned that I must exist, and microscopists have been looking for me, and they think they have found me." Dr. Wright gave an exposition of the plastidule,—how it is the very "breath of life," and has very much to do with the past, present, and future as a so-called organized being.

Dr. E. H. Raffensberger, Marion, O., read a paper upon "Care of the Teeth during Pregnancy and Lactation." The teeth of pregnant women are more sensitive and troublesome both in diagnosis and treatment. They decay more rapidly. Temporary or palliative treatment by plastics is to be preferred. The saliva is often strongly acid; this is to be neutralized by antacids. If necessary, teeth should be extracted rather than left in. The impression left by the shock of extraction would be less than that of protracted aching.

Dr. H. A. Smith. Interstitial change does not account for the cause of caries. We must look for the first cause in the oral secretions and fermentation. After the dentine is reached, decay will then progress more rapidly if the structure of the dentine has been changed.

Dr. J. Taft. I believe, as is generally understood, that the teeth during gestation and lactation are more liable to decay. It seems there is a change in the organic materials. The dentine is softer and more sensitive by this change of constituents and nervous system. There is a want of nutrient supply.

Dr. W. S. Elliott, New York, read a paper on "Erosion of the Teeth." Dr. Elliott, after reviewing the theories of Drs. Kirk, Black, and Truman, gave a very plausible theory of the cause of erosion by the breaking up of glucose into lactic acid, which acts upon the teeth. This takes place when there is a surplus of glucose, and is represented in the following formulæ:

$$\underset{\text{Starch.}}{C_6H_{10}O_5} + \underset{\text{Water.}}{H_2O} = \underset{\text{Glucose or Grape-Sugar.}}{C_6H_{12}O_6}$$

$$\underset{\text{Glucose.}}{C_6H_{12}O_6} = \underset{\text{Lactic Acid.}}{2C_3H_6O_3}$$

By the action of ptyalin on the starch it takes up a molecule of water, and is converted into glucose or grape-sugar. If this is not in excess of the demands the glucose undergoes no change, but if there remains a surplus this is decomposed and forms two molecules of lactic acid.

The forenoon and evening of the second day were devoted to the reading of papers, and the afternoon to clinics and the exhibition of appliances.

Dr. S. D. Stewart, Akron, O., read a paper upon "The Physiology of Nutrition, with Legal Aspects." There is a relation of all the organs to the complex phenomenon, nutrition. If anyone is injured, nutrition cannot be perfectly accomplished. Likewise from without the food must be pure and contain the proper materials, or nutrition of the different tissues will be imperfect. Dr. Stewart gave at length the extent to which some of the food-stuffs are adulterated, and the injury which is produced by the deleterious ingredients.

Dr. A. O. Rawls, Lexington, Ky., read a paper upon "Heredity." The habits, customs, or environments of an animal, if continued through a number of generations, will produce a change in the physical appearance and make-up, to conform to these conditions. This modification will then be transmitted. So we may take advantage of this fact, and by it produce a better race in the future.

The paper was discussed by Drs. Taft, Harroun, and others.

Dr. H. H. Harrison read a paper upon "Relationships." All the organs are in a very intimate relationship with one another. The primary cause of caries lies in the faulty development and faulty performance of function of some one of these organs. There is an improper relationship. Secondary caries is only the fulfillment of the natural law. It is a fact not receiving much attention that badly developed teeth are often accompanied by defective development of the bones.

Dr. H. A. Smith read a paper upon the "Sterilization of Dentine before Filling." It is often best to leave a portion of decalcified dentine as a protection to the pulp before filling. This protective layer is full of micro-organisms, and must be sterilized. If sterilized, it forms one of the best cappings. In order to disinfect this, the agent must not coagulate, and must be diffusive, so as to insinuate itself as far as the bacteria have penetrated. The essential oils are the best for this purpose. Equal parts of oil of cassia and oil of cloves is non-irritating. Dryness is quite necessary in this treatment, since water opposes penetration and diffusion. The use of alcohol and hot air is the best method for desiccating.

Dr. J. R. Callahan. Carbolic acid is a good agent. Dr. Miller speaks very highly of trichloride of iodine.

Dr. Otto Arnold. I prefer pyoktanin in the back teeth.

Dr. H. T. Smith. Pyoktanin will bleach out in time. Chloride of gold stains, but also bleaches.

Dr. J. Taft. We should leave very little decay; but if any is left, if the borders are hard and the stopping good, no harm will result.

Dr. A. O. Rawls. It is an impossibility to have perfect contact.

On the third day Dr. G. S. Junkerman, Cincinnati, O., read a paper upon "What causes Variety and Modification in the Character of Dental Caries?" Of the action of the various fungi we know but very little, except that they destroy the organic portions of the tooth-substance. Of the action of each particular fungus we know nothing, so we will assume that this action is uniform in all fungi, and we account for the variety and modification of caries by the condition of the acid producing it.

The forms of caries will vary with the kind of acid, the degree of concentration of the acid, and the persistence with which it remains at the seat of the disease. Strong acids with short duration produce large surface and shallow depth ; weak acids and long duration produce deep cavities, with small openings. Soft decay arises from the fact that the acid performs its work and the fungi are slow to act. Hard decay comes from the reverse action of the acid and fungi. Sensitive caries arises when the dentinal tubuli remain intact ; non-sensitive caries when the tubuli are destroyed. The very hard and the very soft varieties are non-sensitive, while the leathery variety is sensitive. Color of caries is also due to the nature of the acid, although habits of the individual change it somewhat, as in the use of tobacco.

Dr. J. R. Callahan, Cincinnati, read a paper on "Combination Fillings." Soft teeth call for soft materials in contact with the tooth-substance. Combination fillings of amalgam and gold, and tin and gold, are indicated, and are successful measures. In these combinations the matrix can hardly be dispensed with. Amalgam may be used in deep approximal cavities as a foundation, and in this is worked gold until it becomes hard, and is then finished with gold foil at the same sitting. Also in similar cases tin and gold rolled into ropes may be used at the cervical border, and cohesive gold used in finishing. The tin and gold used in this combination seems after a time to undergo a change and become very hard and granular, and as a tooth-preserver is excellent.

Dr. Callahan exhibited fillings made in the above manner, and some with a base of Robinson's tin foil.

Dr. H. A. Smith. Combination fillings are more economical in both time and expense. A combination of phosphate of zinc and crystal gold makes a good filling, as does also phosphate of zinc and amalgam. A mat of crystal gold quickly set in cement makes a good foundation and an easy beginning for a gold filling.

Dr. J. Taft, Cincinnati, read a paper on "Dental Hygiene." The want of appreciation is frequently the cause of uncleanliness. Dentists are so often taken up with filling teeth that they entirely overlook prophylaxis. The necessity for cleanliness has not been urged as it should be, too much attention having been given to general health as compared with the health of the mouth. There is little literature on the subject, and this may be from ignorance. The mucus, especially in mouth-breathers, becomes dried, causing fetor. It is just as important to clean the teeth of the patient and urge cleanliness as it is to treat an abscess or fill a carious tooth. It is the dentist's duty to insist upon cleanliness.

Dr. C. R. Butler read a paper upon "Ichorrhæmia." If the affection is local, as from teething, lancing is indicated ; but if of a general character, tonics should be given. Dead pulps, abscesses, ulcers, pus-pockets, become points of infection. The salivary glands are often affected. Abscesses of temporary teeth frequently give rise to serious trouble. Opening of pus-pockets does not always effect a cure.

The following officers were elected for the ensuing year: Dr. J. R. Callahan, Cincinnati, O., president; Dr. Geo. H. Wilson, Painesville, O., 1st vice-president; Dr. Chas. Welch, 2d vice-president; Dr. Otto Arnold, Columbus, O., secretary; Dr. Henry Barnes, Cleveland, O., assistant secretary; Dr. C. I. Keely, Hamilton, O., treasurer.

Dr. Geo. Melotte gave a clinic upon crown- and bridge-work, by constructing a bridge for lower case of two bicuspids and molars. He also showed how to weld 22-carat gold, instead of soldering.

Dr. J. R. Callahan, of Cincinnati, inserted a combination filling in a left lower molar.

Dr. W. S. Elliott, of New York, demonstrated glass filling.

Dr. Dougherty, of Canton, O., exhibited a new dental motor, which is neat and compact, and reversible, and is to be used on the bracket of the engine.

Dr. L. E. Custer, of Dayton, O., exhibited the following new electrical appliances, of his own construction: A reversing appliance for the belt, for electric motors which do not reverse; also a brake for the same. An electrical gold annealer, which consisted of a mat of platinum wire in coils, covered with a sheet of mica. The platinum is raised to any degree of heat from the 110-volt current, and controlled by a rheostat. An electric match which would light an alcohol lamp and do away with matches was made of a rubber handle and two platinum points for making and breaking the current. A method of heating water to 100° F. was shown. This consisted of a six-candle power lamp immersed in a tumbler of water. It is used as a resistance for other electrical appliances. An appliance for making copper amalgam was interposed in the current used on the motor. This furnished part of the necessary resistance.

ST. LOUIS DENTAL SOCIETY.

THE St. Louis Dental Society met at the residence of Dr. Conrad on January 5, 1892, and elected the following officers for the ensuing year: Dr. Geo. Robitoy, president; Dr. Walter M. Bartlett, vice-president; Dr. J. B. Vernon, recording secretary; Dr. John G. Harper, corresponding secretary; Dr. Henry Fisher, treasurer; Drs. Helmuth, Lindsley, and Keith, committee on publication; Drs. Morrison, Hickman, and Spaulding, committee on membership; Drs. Baird, Prosser, and McNamara, committee on ethics. The executive committee consists of the officers of the society.

Regular meetings are held on the first Tuesday of each month, excepting July, August, and September.

JOHN G. HARPER, *Cor. Sec.*,
800 Pine street, St. Louis, Mo.

ODONTOGRAPHIC SOCIETY OF CHICAGO.

AT the annual meeting of the Odontographic Society of Chicago, held December 16, 1891, the following officers were elected for the ensuing year: E. L. Clifford, president; George J. Dennis, vice-president; U. G. Poyer, recording secretary; T. A. Broadbent, corresponding secretary; E. Noyes, treasurer; E. L. Clifford, George J. Dennis, U. G. Poyer, R. B. Tuller, and C. E. Bentley, board of directors; D. C. Bacon, Louis Ottofy, and D. M. Gallie, board of censors.

DENTAL SOCIETY ANNOUNCEMENTS.

WEST VIRGINIA STATE DENTAL SOCIETY.

THE West Virginia State Dental Society was organized at Wheeling, January 7, 1892. A constitution and by-laws were adopted, as was also the code of ethics of the American Dental Association. The next annual meeting of the society will be held in Wheeling on the first Wednesday in October, 1892.

H. H. HARRISON, *President*, Wheeling, W. Va.
GEO. I. KEENER, *Secretary*, Morgantown, W. Va.

ALUMNI ASSOCIATION OF THE PHILADELPHIA DENTAL COLLEGE.

AN annual meeting of the Alumni Association of the Philadelphia Dental College will be held February 24, at 3 P.M., in the college building, on Cherry street, above Seventeenth. Banquet in the evening. All graduates of the Philadelphia Dental College are invited to attend.

L. GREENBAUM, *Secretary*,
433 Franklin street, Philadelphia.

LOUISIANA STATE DENTAL SOCIETY.

THE annual meeting of the Louisiana State Dental Society will be held at New Orleans on the 2d of March, 1892,—the day following Mardi Gras. At this time very liberal rates can be secured, and the profession is cordially invited to attend. The committee has left nothing undone to make the meeting one both of pleasure and profit.

DR. J. E. DUGGER, *Cor. Sec'y.*,
Natchitoches, La.

ALVARENGA PRIZE OF THE COLLEGE OF PHYSICIANS OF PHILADELPHIA.

THE College of Physicians of Philadelphia announces that the next award of the Alvarenga Prize, being the income for one year of the bequest of the late Señor Alvarenga, and amounting to about one hundred and eighty dollars, will be made on July 14, 1892. Essays intended for competition may be upon any subject in medicine, and must be received by the secretary of the college on or before May 1, 1892. It is a condition of competition that the successful essay or a copy of it shall remain in possession of the college.

CHARLES W. DULLES, *Secretary*.

EDITORIAL.

MORSAL.

The imperfections of dental nomenclature have been frequently alluded to, and sporadic efforts for its improvement in various details and as a whole have been made, both by writers upon the subject and by speakers in dental meetings. While these have had their influence, a permanent improvement in this or any other system which involves an educational advance upon the methods in popular vogue can only be achieved by slow degrees and by constant reiteration.

A most conspicuous need in our dental terminology exists for an adjective term to describe the masticating or grinding surfaces of the molars and bicuspids, the incisive or cutting edges of incisors and points of the cuspids,—in short, the portions of the teeth immediately concerned in the performance of their function. No such general term exists; hence, in the description of cavities or fillings located upon the surfaces alluded to, we are compelled to make use of cumbersome sentences to designate their position: *e.g.*, grinding-surface cavities, fillings, or cavities upon the masticating or grinding surface, cavities or fillings upon the edge or incisive edge of incisors or the points of cuspids, etc. Every other surface of the teeth is readily designated by a single adjective, as buccal, lingual, labial, palatal, mesial or distal approximal. Molar surface (Lat. *mola*, from *molere*, to grind in a mill) would sufficiently and properly define the grinding-surfaces of molars and bicuspids, but for the purpose under consideration is inadmissible for the reasons that the word already has a specific meaning in its application to certain entire tooth-forms, and would be inadequate in that it would not properly describe the analogous position on the incisors and cuspids.

As a suggestion which, if it fails as a solution of the difficulty, may at least call attention to it and lead to the adoption of a more suitable term, we have to offer the word *morsal*, an adjective regularly derived from the Latin *morsum*, from *mordere*, to bite, gnaw, chew, etc. As derivatives from the same root we already have *morsel*, a bite, a mouthful, a bit of food; *morsitation* [obs.], the act of biting or gnawing; *morsure*, the act of biting, etc. The Latin root is sufficiently general in its meaning to cover the individual masticatory function of any tooth, so that the adjective derived from it could be used with perfect propriety in the description of any imperfection of or operation upon said surfaces; hence, in general, morsal cavities, morsal fillings, morsal aspect, etc., would mean specifically cavities, fillings, or position upon the grinding or masticating surfaces of molars and bicuspids, the cutting or incisive edges of incisors, or upon the apices of the cuspid crowns.

The need which the foregoing suggestion is intended to meet is not a fanciful one, but is constantly encountered by all who are related to dental literary work, by dental teachers, and even by occasional speakers, who are more or less hampered in their efforts at scientific clearness and exactitude of expression by the lack of a systematic term for the purpose noted, which is in harmony with the terminology in general use descriptive of the other tooth-surfaces. With a view to securing a correct and descriptive adjective term we shall be glad to receive any suggestions, and when the evidence is sufficient to warrant a correct judgment as to the merits of the proposed term, use our best efforts to secure its general adoption.

WORLD'S COLUMBIAN DENTAL CONGRESS.

A PRELIMINARY meeting of the executive committee of the World's Columbian Dental Congress was held January 11, in Chicago, to consider ways and means and formulate plans for the prosecution of the work incident to the organization of the Congress. The title of the meeting was changed from World's Columbian Dental Meeting to World's Columbian Dental Congress. This was done after consultation with and at the suggestion of the president of the World's Congress Auxiliary, to make the title of the dental meeting harmonious with the several other congresses to be held during the time of the World's Fair.

The date of the Dental Congress has been definitely fixed for August 17 to 27, 1893. Most of the meetings will be held in the Art Palace, the auditorium of which will hold about 3500, in connection with which there are many smaller rooms for the accommodation of committees, sections, etc.

All the sub-committees with one or two exceptions have been appointed, so that the work of each will commence at once. The meeting of the executive committee was characterized by an enthusiastic determination to make the World's Columbian Dental Congress a great success, by embracing the opportunity afforded to demonstrate to the world the rightfulness of the claim which American dentistry makes to pre-eminence.

A special committee was appointed for the purpose of furnishing to the dental profession all necessary information as to details from time to time.

In our issue for March we will publish a full list of the committees, and an account of all that has been accomplished up to that date.

BIBLIOGRAPHICAL.

Age of the Domestic Animals. Being a Complete Treatise on the Dentition of the Horse, Ox, Sheep, Hog, and Dog, and on the various other means of determining the age of these animals. By Rush Shippen Huidekoper, M.D., Veterinarian (Alfort, France); Professor of Sanitary Medicine and Veterinary Jurisprudence, American Veterinary College, New York; Fellow of the College of Physicians, Philadelphia; Honorary Fellow of the Royal College of Veterinary Surgeons, London; late Dean of the Veterinary Department, University of Pennsylvania, etc. Illustrated with two hundred engravings. Philadelphia: The F. A. Davis Co., 1891. Pp. 217, royal octavo. Price, cloth, $1.75.

The author of this work has admirably met a need which has long existed for just such a treatise. It may not at first thought seem clear that the subject has great importance, but a perusal of Dr. Huidekoper's work dispels any doubtful reasoning upon this point. Our great dependence upon the domestic animals for many of the comforts as well as actual necessities of life is generally recognized, and the means by which their age may be determined with reasonable accuracy become at times important economic factors, having also in numerous instances definite legal bearings. The present work is not only a reliable guide for estimating the age of the domestic animals, but from a purely scientific standpoint its data form a most interesting study in comparative anatomy and physiology. It is a valuable contribution to the knowledge of a most important subject, which heretofore has received but meagre treatment.

The Microscope and its Revelations. By the late William B. Carpenter, C.B., M.D., LL.D., F.R.S. Seventh edition, in which the first seven chapters have been entirely rewritten and the text thoroughly reconstructed, enlarged, and revised by the Rev. W. H. Dallinger, LL.D., F.R.S., etc. With twenty-one plates and eight hundred wood engravings. Philadelphia: P. Blakiston, Son & Co., 1891. 1100 pages, 8vo. Price, cloth, $6.50.

The seventh edition of this standard work is practically a new book. Not only has the old text been thoroughly revised and largely rewritten, but much new material has been added. The initial chapters give an extremely satisfactory presentment of the laws of refraction as related to amplifying power and the elementary principles of optics as related to microscopy, in which these subjects are treated with great clearness. The author, while fully recognizing the value of an intimate knowledge of higher mathematics for attaining the best results, appreciates the fact that good work can be done by the use of correctly-prepared tables of constants, sines, etc., in the belief that the microscope may be used as an instrument of precision even by one who may be unable to solve the proofs of the formulæ used.

A full description and history of the instrument is given, in its evolution from the simple lens to the modern compound microscope, with the various modifications which it has undergone in adapting it to special lines of research. Also a description of what is desirable in a microscope, with a study of microscope accessories, preservative media, staining methods, and directions for mounting, collecting, and arranging specimens.

Sections follow containing elaborate studies of the microscopic forms of vegetable and animal life, their natural history, structure, methods of growth and reproduction ; the uses of the microscope in geological investigation and its application to the study of crystallization, polarization, and molecular coalescence ; followed by an appendix of tables useful to the microscopist and a full index.

The work is a systematic treatise, cyclopedic in character, fully and handsomely illustrated, and in its new dress will be more highly than ever appreciated by workers with the instrument as a reliable authority and complete text-book for this method of scientific investigation.

TRANSACTIONS OF THE AMERICAN DENTAL ASSOCIATION, at the Thirty-first Annual Session, held at Saratoga Springs, N. Y., commencing on the 4th of August, 1891. Octavo, cloth, pp. 272. Philadelphia : The S. S. White Dental Mfg. Co., 1891.

Though a little tardy in appearing, this volume will be none the less welcome to those who look forward to its annual advent with confidence of finding in it much that is of lasting value. There are so many excellent papers that it would be manifestly unfair to particularize. The illustrations are numerous and costly, and of subjects of practical value to every dentist. The obituary notices of Dr. W. H. Atkinson and Dr. James W. White were conceived in a spirit of justice to those eminent men, who passed away since the previous meeting. An appendix gives an authentic list of the dental societies of the United States. Copies of the volume may be obtained of the secretary, Dr. Geo. H. Cushing, No. 96 State street, Chicago.

PAMPHLETS RECEIVED.

Electricity in Carcinoma, by Robert Newman, M.D., New York. Reprinted from the *Times and Register*, October 10, 1891. Philadelphia : The American Medical Press Co.

Lindsay & Blakiston's Physician's Visiting List for 1892. Forty-first year of its publication. Philadelphia : P. Blakiston, Son & Co.

Pearson's Dental Appointment Book. R. I. Pearson & Co., Kansas City, Mo.; Memphis, Tenn.

OBITUARY.

DR. H. G. STAPLES.

DIED, at Lyndon, Vt., December 13, 1891, of inflammation of the liver, Dr. H. G. STAPLES, in the forty-fifth year of his age.

Dr. Staples was born at Middlesex, Vt., July 15, 1847. He commenced the study of dentistry in 1865 with Dr. J. M. Comegys, at Montpelier, and later continued it with Dr. O. P. Forbush, of the same place. In 1867 he entered practice at East Hardwick. In 1875 he located in Hanover, N. H., succeeding Dr. Clark, and remained there three years, when he removed to Lyndon, Vt., where he has resided ever since. He was a member of the New England Dental Society, and while practicing in New Hampshire was made an honorary member of the Vermont Dental Society.

Dr. Staples was an excellent dentist, and of a social, genial nature, and will be much missed among his associates. He belonged to the Odd Fellows and other societies, and was a member of the Methodist Church. He was married to Miss Ellen A. Dodge, who survives him, with three children.

DR. HORATIO LESEUR.

DIED, at Hyde Park, Mass., on Wednesday, December 23, 1891, of chronic bronchitis, Dr. HORATIO LESEUR, in the seventy-first year of his age.

Dr. Leseur was born at Dighton, Mass., June 20, 1820. He entered upon the study of dentistry about 1850, with Dr. Adison Leseur, and entered practice at Boston about 1859. He was a member of the Massachusetts Dental Society. On February 14, 1841, Dr. Leseur was married to Hannah Cook Waterman, who survives him with three married daughters.

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PERISCOPE.

HAND DISINFECTION.—Professor Howard A. Kelly, M.D., read at the fourth annual meeting of the Southern Surgical and Gynecological Association, at Richmond, November 11, 1891, a paper on this subject. He defines sepsis as a technical term designating an intoxication proceeding from certain forms of necrobiosis, or destruction of the minuter elements of the tissues, produced by the action of micro-organisms.

Suppuration is but one of the phenomena (conservative) attending the efforts of certain definite forms of germs to invade the tissues.

The common germs of suppurative wounds are the *Staphylococcus pyogenes aureus*, the *Staphylococcus pyogenes albus*, and the *Streptococcus pyogenes*. Prevent the invasion of these germs and you prevent suppuration.

Disinfection is any means put in action for removal or destruction of these pathogenic germs.

Disinfection of *instruments* and *dressings* by means of steam, and that by Arnold's steam sterilizer, absolutely frees our armamentarium from this danger.

But two important avenues of infection remain,—*the hands of the surgeon*, which will contaminate the wound, and *the patient's own body* (auto-inoculation or auto-infection).

I. *The Presence of Germs on the Hands.*—The *Staphylococcus pyogenes albus*, and sometimes the *aureus*, are present in enormous numbers on the hands and about the nails of every individual associated with medical work in this community. This has been demonstrated by experiment.

II. *The Inadequacy of Soap and Water to Remove all Germs.*—The ordinary practice of washing the hands thoroughly for from five to twenty-five minutes, with soap and water and a scrubbing-brush, is utterly inadequate to remove all the germs.

The undoubted value of such a procedure lies in the fact that it constitutes the best form of mechanical disinfection, removing all easily detachable epithelial and subungual *débris* loaded with germs, thus reducing the chances of conveying infection to those more firmly seated.

III. *Bichloride of Mercury Solutions as strong as 1 : 500 are not germicidal.*

IV. His experiments have demonstrated that the permanganate of potash, applied to the hands in saturated solution and then decolorized by a saturated solution of oxalic acid, is the most efficient germicide in our possession. He has followed this practice in all his abdominal operations for over two years. His method of disinfection is:

1. Scrubbing the hands, with especial attention to the nails,—not more than one millimeter in length,—for ten minutes in water frequently changed, at about 40° C. (104° F.).
2. Immersion of the hands in a solution of permanganate of potash, made by adding an excess of the salt to boiling distilled water, until every part of the hands and lower forearms is stained a deep mahogany red or almost black color. They are then transferred at once to a saturated solution of oxalic acid until completely decolorized and of a healthy pink color. This decolorization is accompanied by a sense of warmth, due to chemical reaction, and a sharp stinging wherever there is any abrasion of the epidermis.
3. Washing off the oxalic acid in warm sterilized water.

By this simple process the hands are rendered more nearly absolutely aseptic than by any other known means.

In fifty experiments after disinfection by this method, forty-four remained without growth; the remaining six yielded respectively eighty, twenty, ten, nine, five, four colonies,—an enormous quantitative difference in favor of permanganate of potash and oxalic acid, as contrasted with soap and water and corrosive sublimate.

HINTS AND QUERIES.

TEETH GRINDING WHILE ASLEEP.—There are occasional instances of the formation of a habit of "gritting the teeth" unconsciously during sleep, so persistent and continuous as to effect a considerable abrasion of the occluded teeth. In some neurotic affections grinding of the teeth upon themselves incidentally accompanies the disease. Under whatever circumstances the useless grinding may occur, its correction will come properly within the province of the dental surgeon.

The indications to be met are the prevention of masticatory action by convenient, cleanly, and safe means which will at the same time permit all other requisite movements of the jaw, lips, cheeks, and tongue.

Probably the preferable method will be to take accurate impressions of the upper and lower teeth, and make plaster casts which shall include only the teeth and the gums between them. Fit a piece of No. 17 spring clasp wire close to the labial and buccal surfaces of the upper teeth, and curve the ends around the last molars of the two sides onto their palatal cervices close to the gums.

Then put the two casts together as they naturally articulate, and model beeswax over and between the buccal surfaces of the upper molars and bicuspids, and over the coronal slopes of the lower molars and bicuspids, taking care that the straight lower edge of the wax work shall extend but a sixteenth of an inch vertically over the lower teeth, and that the nearly straight edge of upper teeth wax work shall not go beyond the buccal cervices of the teeth, and the thickness of wax be no more than necessary to cover the wire as it lies in contact with the molars and bicuspids. On the inside the wax is modeled only between and not quite out to the palatal surfaces of the upper molars and bicuspids.

When the wax work has been properly done, the upper cast is then set in the upper half of a vulcanizing flask, and the investing plaster modeled so as to avoid contact with the lower cast, and permit a subsequent investment of the lower cast that will allow the separating of the casts and flask-halves as usual. The gating of the flask should be so done as to insure the closest possible shutting of the flask, after packing only just enough rubber into the spaces left by the melted-out wax.

If the preceding directions have been carefully followed and the piece properly finished, there will result a gold and vulcanite fixture which may readily be slipped onto the upper teeth; will not obstruct the normal occlusion of the teeth; will not preclude speech; cannot fall into the mouth at the risk of being swallowed or of choking the wearer, yet will effectually prevent the lateral and forward movements of the lower jaw which are essential to the act of grinding the teeth upon each other.—W. S. H.

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

The abbreviations of titles used are those common to bibliographical work, and will, it is presumed, be readily comprehended by any one familiar with dental or scientific publications. Any explanation will be gladly furnished by the compiler. A star (*) indicates a Thesis.

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LIST OF UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING DECEMBER, 1891.

December 1.—No. 464,231, to J. R. ROBINSON. Electric engine.
December 8.—No. 464,922, to T. J. CARRICK. Vulcanizer.
December 15.—No. 465,076, to M. R. GRISWOLD. Dental plate.
" " No. 465,265, to F. E. HANSEN. Rubber-dam clamp.
" " No. 465,337, to M. L. BOSWORTH. Dental mallet.
December 22.—No. 465,457, to J. S. CAMPBELL. Artificial teeth.
" " No. 465,458, to J. S. CAMPBELL. Artificial teeth.
" " No. 465,459, to J. S. CAMPBELL. Artificial teeth.
" " No. 465,460, to J. S. CAMPBELL. Artificial teeth.
" " No. 465,555, to F. H. CROSS and C. H. DAVIS. Separator.
" " No. 465,677, to E. R. PETTIT. Floss silk holder.
" " No. 465,716, to C. A. MEISTER. Rubber-dam clamp.
" " No. 465,735, to GEO. B. SNOW. Vulcanizer.
December 29.—No. 465,952, to D. STUCK. Dental chair.
" " No. 465,953, to D. STUCK. Dental chair.

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ORIGINAL COMMUNICATIONS.

THE ETHNOLOGY OF THE FACE.

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(Continued from page 16.)

CLASSIFICATION OF THE ETHNICAL VARIATIONS OF THE FEATURES.

WE come now to a more minute study of the various features of the face in different races, and for this purpose can most conveniently arrange our observations in tabulated form, which will present a more extensive synopsis of the subject. The variations are so great, and the persistence of primitive types so remarkable, that it will not be possible to follow out the ramifications of typal forms by any other method. It may or may not be possible to construct an ethnological classification of types of features, but we can approach more nearly to it by such a method than by mere description, and averages may be more readily attained.

For convenience we will employ Professor Huxley's scheme of classification,* for, as Professor Tylor says (*op. cit.*), "It is the best tentative classification of the different races," and as such will be best suited to our present study as a basis. He divides the race into four principal types: the Australoid, the Mongoloid, the two European types,—the Melanochroic, the dark-haired races, and the Xanthochroic, or light-haired races,—and the Negroid.

To this we must take the liberty of adding the Americanoid type, as being so distinct as to warrant us in elevating it to the dignity of a distinct branch, equal in importance to the other branches (although it is usually classed as Mongoloid), and in this we are supported by the best ethnologists of the day.

The Australoid type is best represented by the natives of Australia, and next to them the indigenous races of Southern India. The ancient Egyptians used to be supposed to belong to this type.

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* *Journal of Ethnological Society of Great Britain*, vol. ii, 1870, p. 404; Encyc. Brit., vol. ii, page 113.

"The Mongoloid type prevails over the vast area lying east of a line drawn from Lapland to Siam,"—all Eastern and Northern Asia. It includes the Tartar races, Chinese, Japanese, Malay, Eskimo, and many other races which are related to the Mongoloid type, but which vary considerably from one another.

"Of the European types, the Xanthochroi are the fair whites of tall stature, like the present inhabitants of Northern Europe. The type may be traced into North Africa and eastward as far as Hindoostan. On the south and west of Europe it mixes with the Melanochroi, the dark whites, and on the north and east with the Mongoloid races. The Melanochroi are the dark whites, and are of lower stature, and the frame is lighter than the white races. To this type belong the dark Celts, the people of Southern Europe, the Spaniards, Italians, Arabs, and other Semitic peoples, and the type extends as far as India. Endless intermediate grades testify to ages of intermingling of these two types. Professor Huxley is disposed to account for the Melanochroi as being themselves the result of crossing between the Xanthochroi and the Australoids.

"The Negroid type is the primary type of Central Africa, including Madagascar, and has two important collateral families: First, the Bushmen of South Africa, who are diminutive of stature and of a yellowish-brown complexion. The Hottentot is supposed to be a cross between the Bushman and the Negro proper; second, the Negrillos of the Andaman Islands, Malacca, the Philippine and other Polynesian Islands, on to New Caledonia and Tasmania."

The American type is that of the indigenous races of the Western hemisphere, which are so closely related and which bear so strong a family and ethnical resemblance to one another, evidencing their relationship. These races extend from the Eskimo belt on the north (as the Eskimo and Aleuts are true Mongols) to the Antarctic Circle on the south. The type is very uniform except where it has been locally influenced by foreign immigrants, as on the western shores by occasional waifs from Japan, China, or the islands of the Pacific. But these influences are slight and localized, and have not affected the general type.

But the interminable mixture of races has been going on for ages and ages, even long before the historic era, in all lands. Migrations, wars, slavery, extra-tribal marriage, and other causes of mixture have led up to the present heterogeneous mass of mankind as we have it to-day. But yet, in spite of this endless mixture, marked racial types prevail in all peoples, if they can only be followed out, that indicate their ethnic origins. Mixed races tend toward extinction, especially in strange climates, and the tendency is ever toward reversion to the original types, which insures their permanence. But again, these types and sub-types are mixed, so that it is difficult to diagnose even marked characteristics as belonging to any one race. Thus, the types of facial features have been handed down through countless generations, often disappearing to reappear in later times, varied by crossings and the conflict between different racial tendencies, although leading types prevail and are often apparent and easily followed.

The writer has taken the privilege, which is open to all students in the present mode of loose ethnological classification, of rearranging minor types and races in accordance with the very evident affinities which these special studies brought out. An extensive classification of the features of the face seemed to furnish a key to more exact relationships, in many cases, than had been afforded by other means of classification. This may lead to error, as other systems have had their errors, but to the writer seemed sufficient for the present purpose. Further study will correct some of these conclusions, of course.

A series of portraits showing the racial features and variations would be valuable, but portraits of individuals of races, taken at random as they always are, would be of little value, on account of the mixture of features such faces would present. The only thing of that kind that would be of any value whatever to the ethnologist would be composite portraits prepared from a series of photographs of typical individuals of a race, who should be carefully selected by competent ethnologists. A series of composite portraits of typical individuals of various races would be of inestimable value to the ethnologist, and now, in these days of amateur photography, we can hope that such work may be undertaken by competent travelers. But for the present we have no such material, and individual portraits are valueless.

It is not expedient nor satisfactory in a study like this, which has reference mainly to artistic form, to describe the features in mere mathematical formula. Modern anthropometry has developed an elaborate system of measurements, with extensive tables of "indices," that afford little satisfaction in an artistic study. Besides, owing to the never-ending intermixture of races, most of these tabulated measurements, taken at random, are absolutely valueless, even for ethnological purposes. So we confine our tabulated descriptions to forms and outlines, and leave the "indices" to scientific students who demand mathematical accuracy.

The arrangement of the main types has been made with reference to geographic proximity, and not with any regard to ethnical relationship. This geographical classification is for convenience only, in following the distribution of mankind over the earth consecutively.

With these preliminary remarks the following tables are submitted for the further elucidation of the subject. These observations have been gleaned from various sources,* and, while necessarily limited, will give as good a general idea of the types of the features in different races as more extensive tables and descriptions.

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*The tables were compiled principally from the following authorities, with the assistance of several minor writers who have made incidental reference to the features of races:

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TABLE I.

AUSTRALOID RACES.	SKIN COLOR.	HAIR.	CEPHALIC CONTOUR.	GNATHISM.	FACIAL OUTLINE.	FOREHEAD.	BROW RIDGES.	EYES.	NOSE.	CHEEK-BONES.	MOUTH.	CHIN.
GENERAL TYPE.	Chocolate brown.	Black, generally wavy.	Dolichocephalic (long skull).	Very prognathous.	Elongated, crushed in center.	Straight, narrow, small.	Strongly developed.	Dark brown or black.	Broad at end, very deep root.	Moderately high.	Large, with coarse lips.	Small, retreating.
NATIVE AUSTRALIANS.	Chocolate, deep umber, reddish brown, or quite black.	Black to brown, wavy or curly, fine quality; beard full, body hairy.	Dolichocephalic, narrow and small.	Very prognathous.	Long, narrow, center depressed.	Round, narrow.	Large and very prominent, nearly overhanging.	Small, black, and deep set, lid drooping and nearly closed.	Depressed at root, widened at end; no nasal spine, channels instead.	High.	Wide, large, and shapeless, lips red and swollen.	Often retreating.
TASMANIANS. (EXTINCT.)	Dark brown, soot black to yellowish.	Black to dark brown, frizzy or woolly; beard.	Dolichocephalic (a few brachycephalic), keel-shaped vertex.	Prognathous.	Short, square.	Straight, low.	Prominent, glabella large.	Brown.	Broad, very deep root, two channels instead of nasal spines.	High.	Large and well shaped, lips prominent.	Retreating.
NEW CALEDONIANS.	Soot black.	Black, crisp and woolly; beard.	Dolichocephalic.	Very prognathous.	Broad.	High, narrow and convex.	Full, and glabella large.	Dark.	Broad, flat, deep root.	High.	Wide, upturned lips.	Small, retreating.
MELANESIANS.	Chocolate, dark brown to reddish.	Black to brown, crispy and thick; beard long.	Dolichocephalic, skull small and high.	Slightly prognathous.	Elongated.	Retreating.	Prominent.	Dark brown.	Broad, thick, slightly aquiline, deep root.	High.	Large, fleshy lips.	Small, retreating.
DRAVIDIANS OF INDIA.	Brown.	Black, curly; beard.	Medium dolichocephalic.	Mesognathous.	Long.	Straight, low.	Full.	Dark.	Not prominent.	High.	Lips full.	Small.
TODAS OF INDIA.	Brown.	Black, curly; beard.	Medium dolichocephalic.	Mesognathous.	Long.	Low.	Full.	Dark.	Flat.	High.	Wide.	Small.
VEDDAS OF CEYLON.	Brown.	Black, curly.	Sub-dolichocephalic.	Mesognathous.	Long.	Retreating.	Full.	Brown.	Flat.	High.	Large, lips full.	Small.

TABLE II.

MONGOLOID RACES.	SKIN COLOR.	HAIR.	CEPHALIC CONTOUR.	GNATHISM.	FACIAL OUTLINE.	FOREHEAD.	BROW RIDGES.	EYES.	NOSE.	CHEEK-BONES.	MOUTH.	CHIN.
GENERAL TYPE.	Yellowish brown, pale yellow, olive green to brown.	Black, straight, thick, coarse; scant beard.	Brachycephalic, round, high.	Prognathous.	Broad and flat, features run together.	Small, medium, low.	Ridge flat, glabella flat and very broad.	Black, round, narrow, oblique openings, lid droops in inner canthus.	Small, flat, wide, flat bridge, depressed at extremity.	Round, projects externally, massive.	Wide, thick lips.	Slightly projecting, pointed.
CHINESE.	Sallow yellow, light to dark.	Black, straight, long; scant beard.	Sub-dolichocephalic.	Very prognathous.	Upper face long, lower broad.	Straight, medium.	Flat, glabella faint.	Black and dark brown, small, elliptical at inner canthus.	Bridge flat, short and rounded.	High, wide.	Large, lips thickened.	Pointed.
TARTARS. MANTCHUS.	Fair to dark.	Dark to light.	Sub-dolichocephalic.	Prognathous.	Round and flat.	Straight, low.	Low.	Brown, oblique.	Short, rounded, flattened, or aquiline.	High.	Lips thickened.	Pointed.
JAPANESE.	Yellowish, with a little brown.	Black, straight, coarse.	Dolichocephalic.	Mesognathous.	Oval and flat.	Short, low.	Flat.	Dark, small, narrow oblique openings.	Short, low, or aquiline.	High, wide, or medium.	Wide, full lips.	Pointed, small.
INDO-CHINESE OF BURMAH, SIAM, ETC.	Yellowish, brown to olive.	Black, coarse; beard scant.	Brachycephalic.	Prognathous.	Oval, round.	Medium, narrow.	Flat, low.	Black, small, oblique.	Short, flat, upturned.	Prominent.	Wide, lips thick.	Small, square.
MALAYS.	Light brown, tawny, to deep brown or black.	Black to light brown, wavy or straight; beard scanty.	Small, brachycephalic.	Very prognathous.	Oval, tapering to point.	Straight, medium.	Flat, glabella faint.	Black, slightly oblique.	Flat or prominent.	Medium, high.	Large, lips thin.	Large or pointed.
THIBETANS.	Yellowish brown.	Black, straight	Brachycephalic.	Prognathous.	Broad below eyes, and narrow to chin.	Low, narrow.	Low, broad.	Small, black, long-pointed lids	Flat, wide.	Wide, high.	Wide, lips thin.	Pointed.
TURANIANS.	Yellowish to brown.	Black, straight; beard slight.	Brachycephalic.	Prognathous.	Broad, flat.	Low, wide.	Low.	Black, small, oblique.	Broad and flat.	High.	Wide.	Full.

TABLE II.—Continued.

MONGOLOID RACES.	SKIN COLOR.	HAIR.	CEPHALIC CONTOUR.	GNATHISM.	FACIAL OUTLINE.	FOREHEAD.	BROW RIDGES.	EYES.	NOSE.	CHEEK-BONES.	MOUTH.	CHIN.
KALMUCKS.	Yellowish.	Black, straight; beard slight.	Brachycephalic.	Prognathous.	Round.	Broad.	Heavy.	Black, small, oblique, depressed toward inner corners.	Flat, broad at root.	High.	Large, upper lip prominent.	Short.
LAPS.	Yellowish to light.	Black, hard.	Brachycephalic.	Medium prognathous.	Upper wide, lower narrow.	Broad, low.	Prominent.	Large, brown, oblique, hollow.	Short, flat, wide at root.	Prominent.	Wide, lips medium.	Pointed.
FINS.	Light and freckled.	Red and chestnut.	Medium brachycephalic.	Prognathous.	Round, flat.	Low, full.	Prominent.	Gray, blue, or brown, oblique.	Flat bridge, upturned.	Prominent.	Wide, lips medium.	Full.
SAMOYEDES.	Smoky yellow.	Jet black, long, hard; scant beard.	Brachycephalic.	Prognathous.	Wide, flat.	Low.	Prominent.	Black, small, oblique.	Short, flat, upturned.	Prominent.	Wide, lips thick.	Small, square.
YAKUTS.	Swarthy yellow.	Black, coarse.	Brachycephalic, very round and square.	Very prognathous.	Round and flat.	Low, wide.	Low.	Black, deep-set, oblique.	Short, flat.	Prominent.	Medium, shapely.	Round.
ALEUTS.	Dark, yellowish brown.	Black, straight, not coarse; scanty beard.	Medium brachycephalic.	Prognathous.	Medium, long.	Low.	Prominent or low.	Black, slightly oblique.	Flat or aquiline.	Projecting.	Wide, lips medium.	Full, square.
ESKIMO.	Dark yellow tinged with gray.	Straight, black; beard scanty.	Most dolichocephalic, tapering vertex.	Very prognathous.	Broad and flat, narrowing toward chin.	Broad and flat.	Low.	Dark brown, small, far apart, deep-set, oblique, inner corner droops.	Small, flat bridge.	Very projecting, rounded and full, rule lies across without touching nose.	Wide, lips thick and full.	Full.

TABLE III.

MELANOCHROID RACES.	SKIN COLOR.	HAIR.	CEPHALIC CONTOUR.	GNATHISM.	FACIAL OUTLINE.	FOREHEAD.	BROW RIDGES.	EYES.	NOSE.	CHEEK-BONES.	MOUTH.	CHIN.
GENERAL TYPE.	Brownish to olive or white.	Dark brown, wavy, abundant; full beard.	Brachycephalic.	Orthognathous.	Oval or round, center projecting.	Expanded, broad below, narrow and full above.	Arch small but well developed.	Light brown, hazel to black, wide, horizontal.	Narrow, projects, aquiline, nostrils elliptical.	Small and low.	Small, lips turned out, red, rarely thick.	Oval and well developed.
ANCIENT BROWN RACE OF EUROPE.		Very hairy.	Dolichocephalic; high vault.	Very prognathous.	Broad and short.	Narrow, receding.	Very large and round.	Wide, orbits round.		High and heavy.		Small, square.
DARK CELTS.	Brownish.	Dark brown or chestnut; full beard.	Very brachycephalic.	Orthognathous.	Oval or long.	High, broad, full.	Well developed.	Gray to brown, orbits round.	Small, sharp, often turned up.	Low and narrow.	Small, lips thin.	Full, square, jaws angular.
LATIN RACES (SPANISH, PORTUGUESE, ITALIANS, ETC.).	Brownish to olive.	Black or dark brown, curly; full beard.	Brachycephaile.	Orthognathous.	Fine, oval.	Broad, full.	Low or medium.	Brown to black, large.	High, aquiline, end depressed.	Low and narrow.	Small, lips full in center and red, depressed corners.	Small, oval.
FRENCH TYPE (BRETONS, AUVERGNIANS, CELTS, ETC.).	Brownish.	Fair to dark brown.	Very brachycephalic.	Mesognathous.	Oval, large.	Broad, full.	Medium.	Dark brown, orbits round.	High, sharp.	Low and narrow.	Small, lips medium.	Full, square.
BASQUES.	Brownish, sallow.	Dark brown.	Very dolichocephalic; long behind.	Slightly prognathous.	Long.	Narrow, full.	Full.	Dark brown.	Low, sharp.	Full, square.	Wide, lips thin.	Pointed and weak.
MANX AND WELSH.	Brown.	Dark brown.	Very brachycephalic.	Slightly prognathous.	Broad.	Broad, full.	Full.	Dark brown, orbits round.	Low, sharp.	Full, square.	Wide, lips thin.	Small.
DARK HIGHLANDERS.	Light brown.	Dark brown.	Very brachycephalic.	Prognathous.	Broad.	Full.	Full, sharp.	Dark brown, orbits round.	High, wide.	Low.	Medium, lips full.	Square.
SOUTH GERMANS.	Light brown.	Dark.	Brachycephalic.	Orthognathous.	Medium long.	Expanded, large.	Low.	Brown, full.	Low, narrow, aquiline.	Low.	Medium. lips full.	Full, prominent.

TABLE III.—Continued.

MELANOCHROID RACES.	SKIN COLOR.	HAIR.	CEPHALIC CONTOUR.	GNATHISM.	FACIAL OUTLINE.	FOREHEAD.	BROW RIDGES.	EYES.	NOSE.	CHEEK-BONES.	MOUTH.	CHIN.
JEWS.	Fair to brown.	Dark to light, curly; full beard.	Dolichocephalic.	Orthognathous.	Oval.	Narrow, full.	Full.	Dark, large, soft.	Prominent, wide, curved nostrils, end depressed.	Low.	Medium, thick lips.	Small, sharp.
SEMITIC.	Dark brown.	Black or brown, abundant; full beard.	Dolichocephalic.	Orthognathous.	Long, oval.	Straight, low.	Medium.	Dark, large, almond-shaped aperture, external corner long.	Aquiline, end depressed.	Low, sharp.	Medium, firm thick lips.	Round, prominent.
ARAB.	Ruddy brown to fair.	Glossy black, wavy.	Dolichocephalic to oval.	Orthognathous.	Long, narrow, oval.	Narrow, low.	Medium.	Black, almond-shaped.	Root sunk, aquiline, point separated from nostrils, and hooked down.	Sharp, low.	Medium, lips thin.	Oval, receding.
DARK BERBERS AND KABYLES.	Fair to brown.	Black, straight.	Dolichocephalic.	Orthognathous to slightly prognathous.	Long, oval.	Narrow, depression across above brow ridges.	Full, glabella large.	Dark brown to light, large.	Narrow, aquiline, deep at root, turned up at point.	Low.	Wide, lips thin.	Well formed.
ANCIENT EGYPTIANS AND MODERN COPTS.	Yellowish olive to brown.	Dark, straight or wavy; beard scant.	Dolichocephalic; small, long, and narrow head.	Slightly prognathous.	Oval, narrow, and projecting face.	Narrow, receding.	Low.	Brown, small, long.	Low, narrow, curved downward at end.	Low, flat.	Wide, lips full.	Retreating.
HINDOOS.	Rich brown.	Black, wavy.	Brachycephalic.	Orthognathous.	Oval.	High, well developed.	Low.	Hazel, large.	Projecting, narrow bridge, end thick.	Low, medium,	Wide, lips full.	Full.
GYPSIES.	Tawny to brown.	Jet black, straight.	Brachycephalic.	Slightly prognathous.	Long.	Narrow, receding.	Sharp.	Jet black, opening narrow.	High and sharp.	Narrow.	Small, lips thin.	Small, sharp.

TABLE IV.

Xanthochroid Races.	Skin Color.	Hair.	Cephalic Contour.	Gnathism.	Facial Outline.	Forehead.	Brow Ridges.	Eyes.	Nose.	Cheek-Bones.	Mouth.	Chin.
General Type.	Rosy, ruddy, or colorless white.	Yellow, red, or chestnut; full beard.	Dolichocephalic.	Orthognathous.	Long, projecting.	Straight, narrow, tapering.	Medium, prominent.	Blue and gray, narrow, long orbits, horizontal.	Large and straight, point long, nostrils narrow.	Low.	Wide, thin lips.	Well developed, projecting.
Ancient Britons, Modern English.	Rosy white.	Red-haired and blonde.	Dolichocephalic.	Orthognathous.	Long.	Straight, narrow.	Full.	Blue and gray, narrow.	Long and sharp.	Low.	Wide, thick lips.	Strong.
Ancient Scandinavians, and Modern Swedes, Norwegians, and Danes.	White, rosy, or florid.	Fair, blonde, yellow, and chestnut.	Dolichocephalic to medium.	Orthognathous.	Long, oval.	Straight, narrow.	Rather prominent.	Blue and gray, narrow.	Narrow and prominent.	Low.	Wide, thick lips.	Well defined.
Teutonic (Modern North-Germans, Belgians, etc.).	Fair, white.	Blonde or reddish.	Medium dolichocephalic.	Orthognathous.	Long, oval.	Narrow, full.	Rather prominent.	Blue and gray, narrow.	Narrow and prominent.	Low.	Wide, thin lips.	Well developed.
Ancient Goths, Styrians, Swabians, etc.	Fair.	Yellow or reddish.	Medium dolichocephalic.	Orthognathous.	Long, oval.	Full.	Rather prominent.	Blue and gray, narrow.	Narrow and prominent.	Low.	Wide, thin lips.	Well developed.
French Cymric Type.	Florid, freckled.	Red or blonde.	Brachycephalic, round and high.	Prognathous.	Broad.	Broad.	Full.	Blue and gray, circular orbits.	Narrow, point thick.	Prominent.	Wide, thin lips.	Square and firm.

TABLE IV.—Continued.

Xanthochroid Races.	Skin Color.	Hair.	Cephalic Contour.	Gnathism.	Facial Outline.	Forehead.	Brow Ridges.	Eyes.	Nose.	Cheek-Bones.	Mouth.	Chin.
Ancient Caledonians, Highland Scotch.	Florid. freckled.	Blonde, chestnut, or red.	Brachycephalic, round and high.	Prognathous.	Broad.	Broad.	Full.	Blue and gray, circular orbits.	Narrow, point thick.	Prominent.	Wide, thin lips.	Square and firm.
Slavonic, Russians, Scythians, Poles.	Fair.	Blonde, flaxen.	Moderately dolichocephalic.	Orthognathous.	Square, oval.	Narrow, low.	Medium.	Blue and gray, narrow.	Narrow and low, point thick and upturned.	Low, wide.	Wide, thin lips.	Square.
Ancient Irish.	Florid, freckled.	Red.	Brachycephalic, round and high.	Prognathous.	Broad and flat.	Broad.	Full.	Blue and gray, circular orbits.	Narrow and prominent, point upturned.	Prominent.	Wide, thick lips.	Square and firm.
Ancient Libyans and Modern Algerines, Berbers, and Kabyles.	Light and dark.	Blonde, yellow, or reddish.	Dolichocephalic.	Orthognathous.	Long, oval.	Vertical, slightly retreating.	Prominent.	Blue and gray.	Narrow and prominent.	Low.	Small, thin lips.	Square, firm, and well developed.
Ancient Etruscans.	Fair.	Yellow to auburn.	Dolichocephalic.	Orthognathous.	Narrow, oval.	Narrow, retreating.	Low.	Light color and blue.	Narrow and long.	Low.	Wide, thin lips.	Sharp and long.
Ancient Greeks.	Fair.	Blonde or chestnut.	Dolichocephalic.	Orthognathous.	Oval.	High, slightly retreating.	Low.	Blue and gray.	Narrow, prominent, root high.	Low.	Medium, thin lips.	Narrow and firm.

TABLE V.

Negroid Races.	Skin Color.	Hair.	Cephalic Contour.	Gnathism.	Facial Outline.	Forehead.	Brow Ridges.	Eyes.	Nose.	Cheek-Bones.	Mouth.	Chin.
General Type, Ethiopian.	Black to brown.	Black, woolly, crisp or tufted.	Dolichocephalic.	Prognathous.	Narrow.	Low and retreating, or high and bulging.	Low, glabella faint.	Brown to black, wide, full.	Broad and flat, depressed nasal bones, nasal spines absent.	Low, or low and wide.	Wide, dark, lips coarse and full.	Receding.
Negro (Soudan), Obongo (Gaboon), Guinea Negro.	Very black, dark brown to dirty yellow.	Black and woolly.	Dolichocephalic.	Very prognathous.	Narrow.	Low and retreating.	Low.	Dark, full.	Broad, flat, thick at end, nostrils wide.	Projecting.	Lips thick, especially upper.	Receding.
Waganda (Congo), Mandingo (W. Africa).	Bright brown.	Black and tufted; little beard.	Dolichocephalic.	Prognathous.	Narrow.	Narrow and bulging.	Low.	Dark, full.	Rather prominent, nostrils wide.	Low.	Wide, lips thick.	Medium.
Pygmies (Central Africa).	Dark reddish brown.	Black, tufted, body covered with coarse short hair.	Dolichocephalic.	Very prognathous.	Narrow.	Narrow and low.	Prominent.	Small, black.	Flat and wide.	Wide.	Wide, dark, lips protruding.	Small, receding.
Bushmen, Hottentot, Bosjesmins.	Yellowish brown	Black, frizzy, tufted.	Brachycephalic.	Very prognathous.	Broad at cheeks, narrowing to chin.	Narrow from cheeks.	Full.	Deep, brown, long and narrow, large.	Flat or prominent, rather hollow.	High and wide.	Wide, lips very thick.	Small and pointed.
Bantus, Kaffres, Zulus, Bechuanas.	Dark to coffee brown.	Black and woolly.	Dolichocephalic.	Very prognathous.	Broad at cheeks, narrowing to chin.	High and bulging.	Low.	Dark, full.	Rather straight, nostrils wide.	Wide.	Wide, lips medium.	Retreating, or projecting and pointed.
Negrillos, Andaman and Philippine Islanders, etc.	Sooty black to light brown.	Black, crispy, frizzy, curly, very hairy.	Dolichocephalic.	Prognathous.	Short, narrow, oval.	Low and retreating.	Full.	Black, small, deep-set.	Flat, small, nostrils wide; or straight, aquiline.	Low.	Wide, lips medium.	Retreating.
Micronesians, Polynesians, Papuans, etc.	Yellowish to coffee, to dark brown.	Black, smooth, curly; scant beard.	Dolichocephalic and high.	Medium prognathous.	Narrow, oval.	Narrow.	Full.	Dark, deep, wide, bright.	Small, high, slight, aquiline, nostrils wide.	Low.	Wide, lips thick.	Retreating.
Bataks in Sumatra and Borneo, etc.	Clear brown.	Black; full beard.	Brachycephalic.	Prognathous.	Medium narrow.	Narrow.	Very prominent.	Large, black.	Aquiline or prominent, end flattened.	High.	Medium.	Retreating.

TABLE VI.

AMERICAN-OID RACES.	SKIN COLOR.	HAIR.	CEPHALIC CONTOUR.	GNATHISM.	FACIAL OUTLINE.	FOREHEAD.	BROW RIDGES.	EYES.	NOSE.	CHEEK-BONES.	MOUTH.	CHIN.
GENERAL TYPE.	Coppery brown to dark brown.	Black, straight, strong; beard scanty.	Dolichocephalic and brachycephalic.	Medium.	Broad and rather flat.	Low or narrow and retreating.	Medium, glabella prominent.	Deep-set, small, dark, sometimes oblique.	Projecting, arched, nostrils narrow.	Prominent and rounded.	Large, lips medium.	Full or square.
TINNEH, CHINOOK, THLINKEET.	Dark brown.	Black to dark brown, stiff, long, bristly; beard full.	Dolichocephalic.	Slightly prognathous.	Broad and flat.	Low and broad.	Low, long.	Small, dark, or brilliant.	Rather flat, flattened at base.	Prominent.	Large, lips medium.	Small, square.
ATHAPASCAN TRIBES.	Copper brown.	Black, stiff, strong.	Dolichocephalic, square, high vault.	Orthognathous.	Broad.	Low and broad.	Low, sharp, highly arched.	Black and flashing.	Aquiline or broad, nostrils wide.	Prominent.	Broad, upper lip prominent.	Long and pointed, retreating.
ALGONQUIN TRIBES.	Copper brown.	Black, stiff.	Brachycephalic, high vault.	Orthognathous.	Round and full.	Narrow and retreating.	Low, sharp.	Black, sharp.	High, arched.	Prominent.	Wide, lips thin.	Full and square.
CALIFORNIA TRIBES.	Negro black to cinnamon brown.	Black, curly, or stiff.	Brachycephalic.	Prognathous.	Small, narrow.	Low, retreating.	Low.	Dark, narrow.	Short, upturned.	Low, wide.	Wide, lips thick.	Narrow, retreating.
PUEBLOS, MOHAVES, ZUNIS.	Dark brown to coppery yellow.	Black, coarse, stiff.	Brachycephalic.	Slightly prognathous.	Round.	Low and broad.	Low, smooth.	Large, dark, sometimes oblique.	Short, narrow, or prominent.	Prominent.	Wide.	Narrow, square.
ANCIENT MOUND-BUILDERS.			Brachycephalic.	Orthognathous.		Low and broad.	Low, full.			Prominent.		Full, square.
APACHES.	Yellow or reddish brown.	Dead black, long, stiff.	Brachycephalic.	Slightly prognathous.	Round.	Low and narrow.	Full, sharp.	Small, dark.	Short, narrow.	Prominent.	Wide, lips thin.	Narrow, small.
AZTECS, NAHUAS, OTOMIS.	Faint yellow, blue brown, coppery brown to dark.	Black, sometimes wavy.	Brachycephalic, dolichocephalic.	Orthognathous.	Broad.	Medium high and narrow.	Low, full.	Dark, bright, some oblique.	Sharp, prominent.	Prominent.	Wide, lips medium.	Narrow, small.
MAYAS, CHAYMAS, MIXTECAS.	Light brown to dark.	Straight, black; scanty beard.	Brachycephalic, unusually large.	Slightly prognathous.	Flat and broad.	High and narrow.	Low, full.	Dark, narrow, some oblique.	Long, prominent.	Very prominent.	Large, lips thin.	Small, square.

TABLE VI.—Continued.

AMERICANOID RACES.	SKIN COLOR.	HAIR.	CEPHALIC CONTOUR.	GNATHISM.	FACIAL OUTLINE.	FOREHEAD.	BROW RIDGES.	EYES.	NOSE.	CHEEK-BONES.	MOUTH.	CHIN.
CARIBS, ZAPOTECAS, WULWAS.	Light brown to dark.	Shining black, bristly.	Dolichocephalic.	Slightly prognathous.	Very broad.	Narrow and a little prominent.	Low, heavy.	Dark, soft, large, some oblique.	Long, narrow, thick at end, nostrils oblique.	Prominent.	Large, lips thin.	Small, narrow.
PERUVIANS, QUICHAS, AYMARAS.	Yellowish, dark olive.	Black, smooth; beard sparse.	Brachycephalic.	Orthognathous.	Broad and flat.	Round, low.	Medium sharp.	Dark, some oblique.	Prominent, arched, hooked.	Prominent.	Large, lips thin.	Small, narrow.
AURICANIANS, CHILIAN TRIBES.	Clear reddish to brown.	Black, wavy.	Brachycephalic.	Orthognathous.	Round.	Narrow, low.	Medium sharp.	Dark, bright.	Short and flattened.	Prominent.	Not large, lips thin.	Small, narrow.
ANDEAN TRIBES.	Light, to clear olive brown.	Black; sparse beard.	Dolichocephalic.	Slightly prognathous.	Broad.	Broad, retreating.	Low, full.	Small, dark, some oblique.	Flat or arched, high, projecting, upturned.	Prominent, narrow.	Medium, lips thin.	Small, narrow.
BRAZILIAN TRIBES.	Light to dark brown.	Black, long, coarse.	Brachycephalic, square.	Slightly prognathous.	Broad.	Low.	Low, full.	Dark, some oblique.	Prominent.	Full.	Large, lips medium.	Small, square.
PARAGUAYAN TRIBES.	Light to dark brown.	Black, coarse.	Dolichocephalic.	Slightly prognathous.	Broad.	Low.	Low, full.	Dark, long, and narrow.	Well shaped.	Full.	Large, lips medium.	Small, square.
PATAGONIANS.	Dark brown to olive and tawny.	Black, coarse, stiff.	Brachycephalic and dolichocephalic.	Prognathous.	Long.	Narrow, retreating.	Full, sharp.	Dark.	Prominent.	Full, prominent.	Large, lips thick.	Large, narrow.
FUEGIANS.	Dark brown.	Black. coarse.	Dolichocephalic.	Prognathous.	Small, round.	Low.	Low, full.	Dark.	Short, flat.	Prominent.	Large, lips thick.	Small, retreating.

(To be continued.)

IMMEDIATE ROOT-FILLING.

BY DR. R. H. HOFHEINZ, ROCHESTER, N. Y.

(Read before the Union Dental Convention of the Fifth, Sixth, Seventh, and Eighth District Dental Societies of the State of New York, at Buffalo, October 28, 1891.)

DURING my attendance at the Ninth International Medical Congress at Washington, in August, 1887, I listened to a paper which at the time of its reading caused a storm of indignation among some of the best-known members of our profession. The paper was entitled, "Management of Pulpless Teeth." The author, Dr. Junius E. Cravens, advocated two distinct factors in the treatment of pulpless roots. First, the filling of all pulpless roots without any previous use of medicinal agents; second, the immediate filling of all pulpless roots.

He advocated a system of treatment by which the structure of dentine is not impaired by saturation with foreign substances,—a system that recognizes the necessity of a normal pericementum that seeks to protect the membrane from contact with all foreign agents, to the end that a longer tenure of usefulness for pulpless teeth may be assured. He treats the entire matter mechanically. He says,—

"A pulp-canal is merely an axial opening through a root, and the countless tubules that open into it only serve to render canal medication the more objectionable. With a large number of dental practitioners the idea prevails that pulp-canals must always be treated for some imaginary condition before filling."

It seems strange to listen to such words at the present age of bacteriology and antiseptic surgery. If this were to be accepted, what would become of the labors and achievements in the field of antiseptic dentistry accomplished by Professor Miller, of Berlin, that Lister of dentistry, and his able lieutenants, Drs. Black, Barrett, and many others in this country, if one can banish mephitic odors by simply cleaning the canals with a slightly "barbed broach, about which a few fibers of absorbent cotton have been loosely wound so as to form a swab"? and yet the doctor claimed success by this mode of treatment.

Whatever may be the opinions of others regarding the value of this paper read four years ago, it cannot be denied that it was one of the first advocates of a mode of filling roots by the "immediate" system,—a method which, though much contested by some of our most able men, gains more ground daily.

The filling of root-canals has been spoken of in every dental society. The literature on the subject abounds in contributions of all kinds, and yet a uniform method has not been established. We find one who will put a pellet of cotton, saturated with some antiseptic, in the root-canal again and again; and when the patient, tired of the numberless calls, timidly asks the doctor, "How often must I come yet?" the answer is finally given, "Just once more." We find the one who fills each root with cotton claims success. I have even heard men, who in local societies stand well, claim that their best success is in cases where they did not fill roots at all. We have also within the last few years the men who fill roots by the immediate filling system and claim success.

It seems a little strange to find so many ways leading to success. Be the success but relative, it must be admitted that it is not the method only that insures success in root-filling.

The only way to prove the relative success of any new mode of treatment is by comparative statistics with those of other methods. The only complete comparative statistics that I was able to obtain in the literature accessible to me were those of Dr. George Cunningham, of Cambridge, England. He gives an account of all roots filled both by the dressing and the immediate methods from 1882 to 1887.

All roots were cleansed, treated antiseptically, and filled with oxychloride of zinc (in most cases):

	Total No. Cases.	Percentage.
Dressing	122	100
Immediate	512	100

Cases requiring subsequent treatment :

1. For slight periostitis. Dressing	36	29.5
“ “ “ Immediate	3	1.15
2. For swelling or abscess. Dressing	32	26.2
“ “ “ Immediate	5	0.27
3. By extraction. Dressing	6	4.91
“ “ Immediate	3	0.58

Cases compared in equal periods, 1883–1884 ; 1886–1887:

Total number. Dressing	38	100
“ “ Immediate	150	100

Number of these in which permanent fillings immediately followed :

Dressing	2	5.26
Immediate	61	40.66

These statistics speak very powerfully, and I regret that I cannot give any additional ones of such precision.

In filling root-canals I look upon three factors as the most essential for success :

1. A healthy diathesis of the patient and good, active vitality.
2. A skillful manipulation.
3. Antiseptic remedies.

I believe with Dr. Fillebrown and the many authorities he quoted that vitality is one of the most powerful germicides. In a quotation from Dr. Lawson Tait he says,—

"The uniform experience of operating surgeons has taught them that the success of their work depends upon three factors : first, the condition of the patient ; second, the condition of his surroundings ; third, the nature and extent of the operation performed. Of these three, undoubtedly the most uncertain factor is the first. What condition of the system it is which is most favorable to operations is almost unknown. I am perfectly certain that apparent perfect health is by no means a certain indication of a power of resistance to those conditions which result in septic poisoning."

This sentence holds equally good regarding root-filling. It is well known that the most carefully treated teeth, with patients of an apparently healthy diathesis, have given subsequent trouble.

Before entering on the subject proper of the treatment of pulpless teeth, I wish to state that I am one of the few unfortunate ones to whom the Latin adage, "*Nemo artifex nascitur,*" applies ; one of the few who meets with failures in all branches of his profession. The absolute filling of all pulp-canals to the very apex (and sometimes a little beyond it) is an achievement which is foreign to me. I try to get to the apex as nearly as I can, and then stop.

Pus-formation, pyæmia, and septicæmia are due to the existence of micro-organisms or the alkaloids of their waste products, and it is pretty generally conceded that nearly all of the diseases the dentist is called upon to treat are due to the presence of bacteria. There are four different conditions in which a pulpless root may present itself for filling:

(*a*) Where the pulp was removed at the time in a comparatively healthy or non-putrescent condition, being recently destroyed;

(*b*) Where the pulp-canal is found in an empty and dry condition;

(*c*) Where the pulp was in a putrid state with accompanying blind abscess;

(*d*) Where a fistulous opening exists.

There is, I believe, no discrepancy of opinion regarding the filling of the root-canals, if presented in the first condition of newly-destroyed pulps. This condition and the second and fourth conditions are the most favorable for immediate root-filling.

The first essential in getting at any root-canal is to gain direct access, and not try to work around corners, whatever tooth-structure may have to be sacrificed.

The second essential I believe to be the enlargement of every root-canal to its utmost possibility, and I believe that to that procedure more than to anything else are due the more successful operations.

Where the pulp has been destroyed, the tubuli remain filled with organic matter to decompose in time and generate gas. However a pulp-canal may be treated to get it into a septic state, the question, Have the tubuli been thoroughly reached by the germicides? remains in doubt; if not, gases may permeate the cementum and cause irritation of the pericementum. I therefore strongly urge the enlargement of every pulp-canal "if possible." Every successful cut disposes of some material that may give trouble in the future.

The next step, after as thorough a mechanical cleansing as the individual case may permit, will be the choice of the best remedy to render the pulp-canal aseptic.

Dr. G. V. Black, writing on the value of antiseptics, says, "The antiseptic value of a drug is best expressed by its range of effective work. This range of value is found in the difference between the saturated solution, or that concentration that may be found injurious to the tissues, and the greatest dilution that inhibits the development of micro-organisms. Those essential oils that are not too irritating have an extension of range in their use in emulsion or in substance."

In one of the many scientific papers that Professor Miller has presented to the dental profession, there is one on "Experiments on the Comparative Value of Various Antiseptics in the Treatment of Diseased Teeth." In it he says, "If we ask the question, Which of the many antiseptics found in the dental materia medica is best adapted to prevent decomposition either of inextricable pulp-remains or of whole pulps? we will obtain answers which will convince us that the greatest diversity of opinion exists in regard to this question." The article is followed by a description of different experimentations to determine what antiseptic penetrates pulp-tissue most readily and deepest, and most effectually preserves it from decomposition. He arranges them in the following classes:

1. Those pre-eminently active in preventing decomposition of the pulp-tissue: bichloride of mercury, cyanide of mercury, trichlorphenol, sulphate of copper, carbolic acid, oil of cinnamon, chloride of zinc, campho-phenique, and hydronaphthol.

2. Those of doubtful value: thymol, salicylic acid, eugenol, naphthol, acetico-tartrate of aluminum, five per cent. solution of bichloride of mercury, and some essential oils.

3. Those nearly or quite worthless: iodoform, basic aniline coloring-matters, borax, boracic acid, chloride of lime, peroxide of hydrogen, iodol, tincture of iodine, spirits of camphor, naphthaline, the double cyanide of mercury and zinc, and many essential oils.

Like all experiments of Professor Miller, these are also based upon profound and careful researches, and we can undoubtedly safely accept the results, which limit very materially our choice of antiseptics.

The last step in filling pulpless canals of teeth is the filling proper. You all know how many different materials are used and recommended, the principal ones being gutta-percha, chloro-percha, oxychloride of zinc, oxyphosphate of zinc, gold, tin, lead, wood, cotton, and no doubt a number of others. Oxychloride, owing to its antiseptic property and the assumption that it penetrates the tubuli, is preferred by many. Gutta-percha, introduced in various ways, is preferred owing to its easy manipulation, non-destructibility, and, as Dr. Barrett says, "its being a neutral material." I confine myself to gutta-percha, chloro-percha, and oxychloride of zinc.

As previously mentioned, there is little or no discrepancy of opinion about the filling of condition *a*, where pulps are freshly destroyed and extirpated. Condition *b*, where the pulp-canal is empty and relatively dry, is very favorable for immediate filling, provided no blind abscess can be diagnosed.

My mode of treatment, after a thorough mechanical cleansing, is disinfection by a ten per cent. solution of bichloride of mercury, and in back teeth I use as strong as a twenty per cent. solution.

I have acidulated my bichloride of mercury since the controversy of coagulants and non-coagulants has existed, but I am unable to see any difference in the results as yet. After the use of the bichloride of mercury, of which I am cautious not to pass any through the apical foramen, I follow with full strength of carbolic acid, with which I do not hesitate to let the apical foramen be minutely penetrated.

Dr. French, in his able paper on carbolic acid, says, "It seems to have the effect of promoting growth of healthy granulations and hastening the healing processes of wounds. It relieves pain without causing inflammation, and arrests suppuration." After drying the canal both by absorption and heat, I fill it permanently.

Condition *c*, where the pulp-canal is in a putrid state and a blind abscess can be diagnosed, is the least favorable for any filling, be it by the immediate or the dressing system.

The blind abscess which is the source wherefrom future trouble may arise, I treat in the following manner:

After the mechanical cleansing I inject peroxide of hydrogen into the abscessed tissues. Dr. Richardson, of London, found that peroxide of hydrogen imparts its oxygen to the diseased tissues, thus destroying them. Its great affinity for pus makes this drug valuable as a diagnostic remedy, apart from the use of the microscope to determine the presence of pus-corpuscles. After the frothing process has ceased, I follow with ten per cent. solution of bichloride of mercury, follow with carbolic acid, and finish by crowding iodoform into the root previous to filling. Although the recent experiments of Miller and others have proven the worthlessness of iodoform as a germicide, its use has not been abandoned. So eminent a man as Billroth, of Vienna, has used it quite recently in his antiseptic dressing.

I have found that in all cases of immediate root-fillings of condition *c*, where I used iodoform, the pain was less apt to become intense and the chances for a favorable result greater. This may be owing to the antiphlogistic and anesthetic properties that are attributed to the drug.

After removing the rubber, I apply a twenty per cent. solution of muriate of cocaine to the gum-tissues opposite the apical foramen of the root, and make an incision through the soft parts and alveolar process, thus making an opening for any possible after-formation of pus. I paint freely with aconite and iodine, to stimulate the lymphatics.

Condition *d*, where a fistulous opening exists, is, if there is no obstacle to the passing through of medicinal agents, a very favorable condition for immediate root-filling. After the mechanical cleansing I use peroxide of hydrogen, passing it freely through the foramen with Lewis's abscess-syringe. I then dry the root-canal and fill it with cotton saturated with a ten per cent. solution of bichloride of mercury, to get the effect of the strong germicide in the tubuli. Dry again, and follow with full strength carbolic acid forced through the root and fistulous opening. Dry the canal, fill it, and look for no following trouble.

Previous to filling roots by the immediate system, I had reserved from one-half to one hour daily for their treatment, and I was less successful in my results. I fill, since the introduction of bridge-work, more than double the number of roots, and meet with less after-trouble.

However much the pathological conditions of pulpless teeth and the changes produced by treatment may be a source for debate, there is no question as to the silent eloquence of facts such as Dr. Cunningham has presented in his statistics.

I fully agree with Dr. Miller when he says, "In attempting to assign the success or failure of operations upon diseased teeth to their proper causes, factors of the greatest importance are frequently left out of account, and the results ascribed to some agent which may have been entirely indifferent. One of these factors, which forms the very foundation of successful root-treatment, is the *manner* in which the mechanical cleansing of the canal is carried out."

The fundamental principle in treating diseases is to remove the cause. The primary cause of any pathological condition of a pulpless tooth is the root-canal with its infected tissues. After a skillful manipulation of the root and proper medicinal treatment and thorough closure, I think we can safely trust our new friends, the phagocytes of Metschnikoff, to assist us in conserving the parts that we cannot reach.

Dr. Frank Low, in his paper on Phagocytosis, says, "In the existence of the phagocytes we have an intelligent explanation of the successful outcome of much of the *careless* immediate root-filling which is undoubtedly being done the whole country over." If this theory is applicable to careless filling, how much more assistance must the phagocytes render in *careful* immediate root-filling.

WHERE DENTISTRY LOOKS OVER INTO ORAL SURGERY.

BY G. LENOX CURTIS, M.D., D.D.S., SYRACUSE, N. Y.

(Read before the Union Dental Convention of the Fifth, Sixth, Seventh, and Eighth District Dental Societies of the State of New York, at Buffalo, October 28, 1891.)

THE invitation from your executive committee to read a paper on oral surgery before this convention contained the injunction to "make it especially interesting to dentists." While I can conceive of no phase of this subject which should *per se* be uninteresting to dentists, and no treatment of it fit to be rehearsed before intelligent practitioners which should not attract and hold their attention as well worth the time occupied in listening to it, because of its relation to their own specialty; yet, recognizing that there are degrees of interest even in this, to me, fascinating study, and mindful of the injunction laid upon me, I shall confine myself to the consideration of aspects of oral surgery of which glimpses are seen almost daily in the practice of dentistry. First, let us understand clearly the province of oral surgery. Briefly, it is that branch of surgery which comprises the treatment, usually by operative procedures, of the various lesions involving directly and indirectly the mouth, including the teeth and jaws, and the face and associated parts.

Surgery, like medicine, is too broad and too complicated to be compassed in its every differentiation to the degree required in these days of perfected technique, by any one mind. Every department requires, for the attainment of the best results, concentration of the entire thought upon the particular set of organs involved almost to the exclusion of the remainder of the body, bearing in mind only the fact that other parts may exert an influence by contiguity or by physical or physiological relations, or may become involved by reflex or circulatory action. This concentration and study of minutiæ, with the daring experimental work begotten of more thorough knowledge thus gained, are the secret of the present status of the various specialties in medicine and of the vastly better results of practice by specialists now than in former times, when each practitioner endeavored to cover the entire field.

It is the little things, which because of their littleness are unrecognized and their proper treatment overlooked, that often lead to the most confusing complications. The large tumor, readily detected by any one, requires far less skill to understand as a cause of suffering than does an apparently causeless pain which is finally shown to have been reflected by the sympathetic nervous system from a distant point of irritation.

Oral surgery includes, if you please, in the broader sense, the duties of the dentist. The entire territory over which it assumes jurisdiction is so closely related to that which occupies the thought and confines the effort of the dentist that, other things being equal, there is no question that the best oral surgeon is he who has the most thorough knowledge of dentistry. The eye and the touch of the trained dentist are exquisitely educated to detect small things, and he has an understanding of the mouth and its relations that are even yet unattainable except through the education which has made him a dentist. It is a truism that very recently the general practitioner of medicine knew less of the anatomy and diseases of the oral cavity than of the same facts concerning any other portion of the body. Happily, a more enlightened system of medical education now recognizes the importance of a knowledge of the mouth and its nervous connections, though the study of its special relations is as yet left almost entirely to the dentist.

The reflex nervous system of the human body is often likened to the wires of a great telegraph system. As the touch of the operator's hand upon the key of the transmitter pulsates to the remotest terminal of the wires, so the slightest sensation at any point of the body finds a response throughout the entire nervous system. Thus, a slight disturbance of the equilibrium at one point may be indicated by a neural symptom which finds expression far away from the actual seat of trouble. It is in the elucidation of such problems that the special knowledge of the specialist becomes invaluable. It requires, for instance, an intimate acquaintance with the oral cavity such as only practitioners of dentistry possess to diagnose many of the troubles which fall within the province of oral surgery. We cannot all be oral surgeons, but it is competent for all of us to be diagnosticians.

There is little doubt that almost all the distressing troubles which are found in the head and neck originate within the distribution of the trifacial nerve. In the great majority of instances they can be traced directly to the teeth. Diagnosis by exclusion is perhaps the most satisfactory means of determining the cause of a given lesion. When this is found, the obvious rule is to remove it. But the organism requires every part for the preservation of the proper balance, and conservatism says that a diseased part which can be restored to a normal condition must not be sacrificed ; only that which cannot be made healthy may be removed. Thus, if the pulp of a tooth is the disturbing element, the tooth need not be extracted. A pulp which is exposed may be restored to its normal state and protected from further irritation.

That you may more readily comprehend the possibilities of ordinary lesions in the mouth causing more or less serious disturbances in other portions of the economy, a few cases which I have observed and treated are here briefly outlined.

The first is that of a young woman who applied to a surgeon for treatment of a fistulous opening under the chin, from which a moderate but constant discharge of pus flowed. Suspecting alveolar abscess, the surgeon referred her to a dentist, who returned a negative report. The lower ridge of the maxillary was then drilled and scraped, which apparently effected a cure ; but in a few weeks the fistula again appeared, and was treated by a second and more heroic drilling. In two months the fistula reappeared, close beside the ugly scar of the first. Another dentist was then consulted, and he readily detected, with an electric lamp, a dead pulp in an inferior incisor. The tooth was then drilled into, the canal cleansed, disinfected, and filled, and although that was four years ago there has been no return of the fistula.

This case is typical of a considerable class due to devitalized pulps, where the abscess selects a distant part of the body as an outlet or drainage-point. I have seen fistulas from this cause opening far down upon the neck or upon the back or breast, and have known them to be treated for years before a dentist discovered the offender, much to the surprise of the surgeon. They have in more than one instance caused suspicion of abscessed lung, liver, etc.

Another case illustrates reflex irritation through the sympathetic nervous system. After nearly three years' treatment for a persistent rheumatism of the left shoulder, the patient had a left superior molar treated and filled which had been abscessed for several years. Considerable necrosed bone was burred away from about the upper third and for some distance beyond the ends of the roots. Within two days the tooth recovered its former comfortable condition, and with its restoration to health the pain in the shoulder ceased, and the first symptom of its return has yet to be observed, five months since the operation. This same patient had a bridge adjusted in the right side of the mouth, with the posterior end attached to the second molar. The third molar contained a large gold filling on the mesial surface, which came almost in contact with the bridge. Two months later the patient experienced pain and stiffness in the articulation of the inferior maxillary on the right side, with a heavy, dull feeling in the ear on the same side. This continued with considerable severity for twelve hours. Treatment ameliorated the distress, but it was never intermitted for a single day until it was discovered that an electric current had been established between the bridge and the filling, and by electrolysis the pulp had become exposed, causing the symptoms described, by reflex action. The diagnostic test was the placing of an insulator of gutta-percha between the crown and the filling, when the patient was relieved instantly, the entire train of symptoms disappearing at once. I do not wish to be understood as claiming that there was an electrical action between the bridge and the filling, but merely that the introduction of the bridge upon the roots closed the circuit along the nerve-tract; whereas, without the bridge, the electrical action was wholly confined to the filling and the decalcified dentine covering the pulp.

The history of dentistry is full of instances of pain reflected to almost every part of the body from affections of the teeth. Thus in a case where the arm was paralyzed, the paralysis disappeared with the treatment of an exposed tooth-pulp. In another instance, the removal of a large area of necrosed bone and the restoration of the remaining tissue to normality was followed by the re-establishment of the catamenia, which had been suspended. Another curious case is that of a patient who was confined to his bed for several days with rheumatism involving one entire side of the body. The attack followed a severe toothache, and the pain ceased with the relief of the affection of the tooth.

These are extreme illustrations, but they show how far and in what diverse directions reflexes from the teeth may ramify. The fact that they do occur only serves the more forcibly to emphasize the need of a thorough knowledge on the part of the surgeon of the relations, near and remote, of the oral cavity.

To return to what is more properly our subject,—a partial survey of the border-land between dentistry and oral surgery,—the cause and effects of mouth-breathing require a passing notice. Whether mouth-breathing is a cause of the irregularities accompanying the high vault and contracted jaw is just now a disputed question, to the clearing up of which Dr. Talbot contributed a valuable paper at the recent meeting of the American Dental Association; but that it does result in deformity or asymmetry of the face there is little room to doubt. Mouth-breathing is usually due to obstructions in the nasal passages, the most prolific of these obstructions being found in the upper part of the pharynx, in the shape of adenoid growths. These growths are engendered at all ages, and unless quickly removed, especially in the case of children, irreparable mischief will be wrought. Frequently dentists are consulted by parents with the idea that irregularities of the teeth are the cause of mouth-breathing in their children. In such cases they may be able to do much good by suggesting the importance of attention to any possible obstructions of the character here referred to. Of course the condition is not confined to childhood, but whenever present it can only be rectified by surgical treatment.

The antrum is the seat of a variety of diseases which are by no means readily diagnosed. This cavity is lined with a mucous membrane of the same nature but more delicate than that of the mouth, and is therefore more readily disturbed, and owing to its form and position, its drainage in case of pus-formation is more difficult. When inflammation, however slight, has once been set up within, it is ever after in an irritable condition; and when pus finds its way to this almost closed cavity, the work of destruction of its mucous membrane begins, and unless promptly checked the bony tissue adjacent to the diseased part falls a prey to the destructive pus-cell.

Among the causes of affections of the antrum, the teeth and their diseases stand first. You can readily understand how an abscessed tooth can light up an immediate inflammation in the antrum when you recall the fact that it is not uncommon for the teeth to extend into the antrum,—the impingement varying from the mere penetration of the end of the root to the extent of half of it, with only the mucous membrane intervening. If the pulp of such a tooth becomes putrid, the poisonous influence soon extends to the surrounding tissue. There is no resistance as when the root is enveloped in bone; consequently soreness of the tooth, one of the first symptoms of peridental inflammation, may not be present. Long-continued pulpitis may produce a like inflammation in the antrum. Alveolar abscess should be cured as soon as detected, for obvious reasons.

The common practice of extracting these teeth is unjustifiable. It is true that that procedure often results in a cure of the antral trouble. Why not remove only the putrescent pulp and any necrosed bone, and treat the pathological conditions surrounding the root? Too few physicians place the proper importance on the saving of the teeth, and I regret to say that there are dentists also who do not appreciate the gravity of the loss involved in the wanton sacrifice of a tooth.

Inflammation of the antrum may also arise from a severe "cold in the head"—catarrhal inflammation—when the mucous membrane is generally congested, which condition extends to the antrum; and after the posterior teeth become loose and sore, if the inflammatory state is persistent, the trouble may become chronic. From this condition of the antrum the pulps of the teeth may in turn suffer even to the extent of devitalization, when we have a permanent cause for abscess without external origin. The non-eruption of the teeth is not infrequently the cause of a purulent condition of the antrum, which is difficult to detect, as only in marked cases is there free discharge of pus from the nares, or the formation of a tumor to guide to the point of disturbance. The nervous system is under a constant strain where this purulent condition of the antrum exists. In two cases recently observed, one of the patients had shown marked symptoms of insanity, and the other was insane during three months of the twelve for several years, prior to operation, and her nurse informed me that previous to the clearing of the mind a free discharge of pus from the nose was observable. Frequent and persistent neuralgias can also be attributed to a purulent antrum.

I think it possible that mechanical irritation from the roughened surface of an artificial denture may cause serious antral trouble. The palatal surface of vulcanite plates, especially, is apt to be a source of irritation unless all roughness, such as occurs from bubbles in the plaster, etc., is carefully polished off. A case recently presented, in which the plate was rough from this cause, and it seems reasonable to hold it responsible for a cancerous growth involving the entire space covered by the plate. When constant irritation and congestion of the mucous membrane follows the introduction of an artificial denture, it should be removed and substituted by a material which is non-irritant.

In this brief and somewhat disjointed sketch I have endeavored to note a few of the points in which the dentist and surgeon meet on common ground, and in which the skill of the one must be supplemented by the knowledge of the other. More and more cases will be referred to you by the physician and surgeon for diagnosis, and treatment of that which comes within your purview. Sometimes the process of exclusion will assure you that the teeth are not involved or at fault. In that event the patient passes to the next specialist for his examination, but it behooves you to *know* the territory to which your life-work is devoted, to the end that you may render the greatest possible aid in the alleviation of suffering.

METHODS OF FILLING TEETH.*

BY RODRIGUES OTTOLENGUI, M.D.S., NEW YORK, N. Y.

(Continued from page 120.)

GOLD AS A FILLING-MATERIAL—(*Continued*).

I NOW come to a discussion of the merits and usefulness of heavy or rolled gold. It is procurable in various thicknesses, numbered 30, 40, 60, and 120. The last is an extremity to which we need rarely if ever resort. Numbers 30 and 60 are sufficient for all purposes, and we may practically produce the latter by folding the former once, before cutting.

The earlier advocates of this form of gold were so enthusiastic over it that they claimed to depend upon it entirely. The theory was that the more gold one could crowd into a cavity, the better the result. This is not true. The supreme demand upon any filling is that it shall present a durable surface, and be in close contact with all its walls. It could be hollow in the center, and serve as well. Indeed, hollow fillings have been made, merely to show dexterity, and they

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have preserved the teeth. In large cavities surrounded with strong walls it is not very difficult to accomplish this. The floor and sides are covered with a solid but thin veneer, and then the top is roofed over by building from the margins toward the center, finally closing the last orifice, and leaving the interior of the filling hollow. It is not quantity of gold therefore that is needed. At the same time we must have solidity at the surface, as that means durability. This is best achieved when we depend upon heavy gold for at least the final third. A filling so completed will receive a higher and more beautiful finish, and will retain its luster longer than any other.

I have hinted that there are places, however, where we must depend upon this gold entirely. I will describe them in more detail. We have all of us seen, in crowded jaws, bicuspids so solidly rooted that it becomes almost impossible to obtain extensive separation. Approximal cavities in these teeth, especially where they reach almost to the gum, are most trying. The orifice at the masticating surface is so small that an ordinary pellet is compressed in passing, and yet, when within the cavity, is so loose that it is most difficult to attach it firmly against any gold already in position. Our manipulations only compress it more, when in the end most probably it becomes a non-plastic nodule unfitted for use. It is here that we may turn to heavy gold with entire confidence. Because of its thinness it can readily be passed between the teeth and led into place, when its impaction becomes comparatively easy. Undoubtedly a tooth thus filled entirely with this material will be well filled. If the question be asked, Why not do this in all cases? the reply is, that to do so would be a waste of time, as it takes longer to fill exclusively with heavy foil than where we use a plastic, pellets, or both, for the first two-thirds.

Another most important position for heavy foil is where in, let us say a lower molar, we find a cavity in the masticating surface, and another in the posterior approximal. Imagine this latter to be what we term a saucer-shaped cavity,—one of those exasperating places where we find absolutely no retentive shape, and a tooth so highly organized that every attempt to use the engine, or an excavator, causes excruciating agony to the patient. It is seen that if the two cavities be united, the whole would at once receive and retain a filling permanently. This is done, but now the question arises, At what point shall the filling be started? It is simply impossible to begin at the bottom of the approximal cavity, because there is no retentive pit or groove to aid us. We therefore begin at the wrong end, according to ordinary principles; that is, we begin at the top and work downward. We fill the cavity in the masticating surface, and then try to build over and down into the approximal portion. This is very difficult with any material, and trebly so with anything except heavy foil. The procedure is to only partly fill the upper cavity, and then, using No. 60 rolled gold, work over the edge, down into the approximal extension. The stiffness of the gold, and the fact that it is a single thickness, tend to make this comparatively simple. Here is a place where the foot-plugger is pre-eminently useful. With it a piece of gold may be first well attached to that already in place, and then the end led over the edge and against the wall of the approximal cavity. A second piece treated similarly will make sufficient stiffness to insure the overlapping part against riding up. Then a step further may be taken, and so on, until all the walls and floor of the approximal cavity are covered, when the completion of the work becomes simple with any kind of gold preferred. Care should be taken that as each new piece is added, it be first securely attached in the upper cavity. This is why I would not fill that part too full at the outset.

There is a most important use for heavy foil, in cases which are frequently very annoying. I allude to cavities at the labial festoon in anterior teeth. We not infrequently find cavities which defy the application of the best clamp at hand. Do what we will, there is a tendency on the part of the clamp to slip so that it passes over the edge and impinges within the cavity proper. In these cases proceed as follows: Get the clamp into place, and hold it there with one hand while the packing of the gold is begun. As rapidly as can be done with safety, fill along the upper edge until there is a good starting-point made, with either crystal gold or pellets. Then take No. 60 foil, cut into pieces about as long as the extent of the cavity and not too wide. Take one of these pieces and lay it upon the gold already fixed, so that about half of it protrudes above the gingival wall and rests against the clamp. Mallet this down only as far as it touches the filling, but leave the protruding portion. Be very careful, however, that the margin is properly covered. Repeat this three or four times. This will give us, say four thicknesses resting against the clamp. If this be now malleted down, a ridge will be formed, extending above the edge of the cavity, perfectly protecting the operator from any slipping of the clamp. The continuance of the filling will become a simple and pleasant task.

In very small cavities in the same neighborhood I have successfully filled with gold, without using the dam at all, by thus throwing up a barrier of gold, and then working rapidly. I have in some instances made this gold wall so high that at the end I have turned it down upon the filling and malleted it solid, though the upper side was wet from accumulated mucus.

The same general plan, though to a more limited extent, may be advantageously resorted to in those cases where, a ligature being an essential, it is found just possible to press it above the cavity margin. There is constant danger of its slipping. Use the heavy foil and form a ridge beyond the margin, as has been described, and there will be no further reason for anxiety as to the ligature.

Sometimes in a large cavity there is an underlying layer of oxyphosphate, either placed by the operator, or found in the cavity from which a leaking filling has been removed. For good reasons in the individual case, it may be desirable to fill with gold without disturbing this. Under the action of the mallet, occasionally a dust is formed by particles being broken from this layer of phosphate. This is not only annoying, but it interferes materially by preventing cohesion of the gold. The filling having been fairly well started, a single thickness of heavy foil may be attached, and then laid down, completely covering the phosphate, and the trouble is remedied.

There is one more use of heavy foil to which I will specially allude, and that will lead me to the proper method of manipulating it.

Once more let us imagine a cavity in the approximal surface of a bicuspid. While we have apparently sufficient space, or so judge at the outset, as the work progresses we wish that we had obtained more ; or let us say that more was unobtainable. The result not infrequently is that near the end we find that the cavity is perhaps filled so far as having its surfaces covered, but we wish to add more gold for the sake of contour ; the filling is flat, whereas we wish it rounding. The space will just admit a thin burnisher. In such a condition we find that there are parts of the filling, about its center, which cannot well be reached with a plugger. I proceed as follows, and I will say here that this is not to be confounded with the Herbst method. I lay a piece of heavy foil, preferably No. 30, within the space and against the surface of the filling. Then with a thin, flat, *clean*, and warm burnisher I burnish the added piece vigorously, whereupon it unites thoroughly with the filling. In a similar way I proceed, adding gold as long as needed, and completing my contour. This makes a hard surface, and though I have practiced this for over ten years, I have never had such portion of my filling scale off. Another, and perhaps more frequent, occasion for this method is where from long malleting, or other cause, a tooth is so sore that it is cruel to use the mallet any longer. I find that ordinary hand-pressure in this case results in no gain. Then I resort to the heavy foil and burnisher, with satisfaction to myself and patient. I would impress one fact upon the mind of the reader : *Never attempt this method until all margins are covered, and never try it with anything but heavy gold.*

I believe that the common practice is to cut heavy foil into narrow strips of considerable length, and fold it over and over as it is packed. There is no objection to this where the operator has acquired the necessary skill. The beginner, however, will find it unsatisfactory, because it is difficult. In fact, heavy foil is the most troublesome of all golds with which to fill teeth. It must be remembered that it is the least pliable, and therefore we readily see that it will be found most unyielding in the hands of one who resorts to it for the first time. It must follow, then, that the less of it the operator has to contend with the more likely will he be to succeed. There is also a strong objection to using the gold in long strips. It will frequently be found that it does not turn over so as to assume the direction desired. Then when it is forced into proper position an angle is crimped up, which when malleted down forms a hill, and is very resistant besides. I therefore think it best to abandon the strip, as I would the rope, and rely upon pieces not much, if any, longer than the cavity. Of course there is not much objection to making one fold with it. Here, then, as with all the other forms of gold, I advocate small pieces. It may seem that this makes a man a slow operator, but in the first place it is better to be thorough than rapid ; secondly, thoroughness does not necessarily mean slothfulness ; and thirdly, it is a fact that these methods may be followed and yet result in rapid work. Even if it did not, the pleasure of seeing fillings five and ten years old, with beautiful smooth surfaces, will repay for the outlay of time, patience, and conscientiousness.

As with other golds, I prefer small points in packing the heavy foils, and certainly the foot-plugger is at its worst when we are using rolled gold. Except when using a burnisher as described, it is a difficult and slow process to pack it by hand. Better and more rapid work results with a mallet, and better still where the mallet is one with rapid stroke, as the electric or the engine mallet.

Before leaving this I will point out one disadvantage of heavy foil. Being of a single layer, it is difficult with it to alter the form of the surface against which it is packed. For example, suppose that in following and covering the walls of a cavity the center is left somewhat hollow. If now we begin to add heavy foil, the hollow will not be materially filled up. The best plan is to alternate with pellets, placing a pellet in the hollow, packing it, then using the heavy foil, then another pellet, and so on till the hollow is filled flush, when we may continue with the heavy foil alone, till the whole is completed. Another thing to be carefully guarded against is to allow a piece of heavy foil to become rumpled or crinkled when placing it between teeth. It will be found doubly resistant in such cases, and so stiff that a good result is hardly attainable. Use it smooth.

Gold in Combination with Oxyphosphate.—I come now to the description of a method of filling teeth which in proportion to its value has been too little considered. It is a general practice in many cases to interpose a stratum of oxyphosphate between tooth and gold. The ordinary custom is to allow the plastic to set, before proceeding with the insertion of gold. I touched slightly upon this subject when discussing oxyphosphate, but I have reserved until this time a fuller description of the method and the conditions in which it is indicated. There are many cases where dentine is excruciatingly sensitive while the tooth is being prepared for filling. I allude to teeth in which there is not a suspicion of pulp-exposure. I state dogmatically and emphatically, that *these hypersensitive teeth should never be filled with gold, allowing the metal to come in contact with the dentine.* To emphasize the point which I wish to make, let us briefly consider the cause of sensitiveness in dentine. Dentine is made up of succeeding stratifications of hollow tubes,—the dentinal tubuli. These tubes contain living matter; whether fluid, semi-fluid, or true nerve-tissue, is undetermined and for my purpose immaterial. The contents of these tubes lead directly to, and come into actual contact with the pulp itself. This pulp is highly organized, and traversed with nerve-filaments to such an extent that no part of it may be touched without responding by a painful form of sensation. Consequently, the contents of the tubuli rest against a tissue which reports painfully upon the slightest provocation. These in their turn, whatever their formation, have the power of transmitting impressions. Thus, when an excavator cuts across them, pressure is produced, and transmitted to the pulp, which responds at once. Now, the dentine is sensitive, or responsive in this way, in exact proportion to the relative size of the tubuli and their contents. That which has a large number of tubuli, with small diameters, will be less sensitive than that which has fewer tubuli of larger size, for here we find more living tissue, more power to transmit pressure, and consequently more pain. The patient says, "Doctor, the nerve is exposed, because you hurt me very much." The learned gentleman remarks, "No, madam; there is no exposure. The dentine is sensitive, that is all." That is all! But microscopically speaking the patient is correct. *The pulp is exposed in hundreds of places. Every gaping tubule is an open passage to the pulp.* Hypersensitive teeth, those which I say should not receive gold directly against the dentine, are those where the tubuli are abnormally large. *To place against the open ends of these tubes a mass of metal of such conduc-*

tivity as gold, is to invite, and often to induce, the death of the pulp. These are the teeth where the patient returns and says, "Doctor, that tooth hurts whenever I drink cold or hot drinks." The dentist replies, "That will pass off." This is true, and it occurs in one of two ways. *Sometimes the pulp dies*, after which of course hot drinks do not cause sensation. Then, again, Nature may succeed in repairing the damage done by the operator. She, with her wonderful intelligence, at once begins a deposition of lime-salts against the surface of the gold. The tubuli thicken as to their walls, so that their contents and consequently their power to transmit impressions diminish. So much for the physiology of the condition. Let us now consider the treatment. It is to *smear the dentine with oxyphosphate, and while this is still plastic, and of sticky consistency, crowd in two or three well-annealed pellets of gold.* In large cavities crystal is better. The phosphate must now be left to set *thoroughly.* Then the gold may be compressed, and will be practically cemented into place. This aids in its retention, *but should not be depended upon to the exclusion of the usual methods of shaping the cavity.* The next step is to carefully scrape off all oxyphosphate which reaches or covers the margins. The filling may then be completed with any gold. It will be claimed that even oxyphosphate is a good conductor of heat. This is true, but it is less so than gold. Besides, the conductivity of a material depends upon its homogeneity. The fact that a filling of this character is composed of two masses, gold and oxyphosphate, renders the whole a poorer conductor than if it were made of either exclusively.

Beginning, then, from the point of using this method in sensitive teeth, we quickly determine to employ it in cases where the pulp is really nearly approached. Here a greater mass of oxyphosphate may be used. When we have become dexterous in the operation in these two classes of teeth, we soon begin to wonder why it is not applicable in those large or deep cavities of retentive shape, but where we find it difficult to obtain a starting-point. At once we see the advantage of using the phosphate *for cementing in the first pieces, merely to start a filling.* As it is perfectly feasible, is it not more sensible than to drill a pit, or bur out an extra groove? So that having passed through all the phases, beginning with ridiculing the method, I have almost reached the point where I use it exclusively. Where I do not employ it is mainly in cavities which are quite small, or where the immediate circumstances seem to make it less convenient or advisable than to depend upon gold alone. It is a habit that will grow upon a dentist, and the result upon the patients in his practice will be a lessening of the number of those reports about teeth being sensitive after filling. Of course there are some teeth which will be responsive to hot and cold, even after this has been done. Then the dentist may be comforted with the thought that it would have been worse if gold alone had been used. Indeed, the pulp would most probably have died.

Gold and Platinum.—This is a preparation furnished by some manufacturers. The exact proportions of the two metals I do not know, but there is enough of the platinum to materially affect the color of the finished filling, though during the operation there will be little, if any, difference in appearance. In the rough, the general surface will resemble any ordinary gold, but as soon as a bur or stone is passed over it the platinum asserts itself, and the yellow almost vanishes, giving place to a color which is not as beautiful as either gold or platinum alone. This matter of color I dwell upon, because to me it has been so objectionable that I have almost abandoned the material. I once had to build down the lower third of a living lateral incisor, broken off by a fall. For some reason, which I have never explained satisfactorily to myself, I used this combination. The patient was charmed, because her one dread was that she would show a lot of gold. I suppose it was mainly to humor this fancy that I did not depend upon gold alone. As soon as she stepped out of the chair and stood a few feet from me, I realized what a mistake I had made. The filling did not show as much as gold, because, except in bright light, *it did not show at all.* It looked so dark that practically the tooth seemed unfilled. To my mind, therefore, it is contraindicated for ordinary work in the front of the mouth.

An advantage which it possesses over gold alone is that it produces a much more resistant surface. That is, it is tougher, or, to express it otherwise, more dense. This quality would indicate its use where we find a whole set of otherwise sound teeth being worn away by abrasion during mastication. Some men chew so hard that they actually wear out their teeth. Ordinary gold fillings only very slightly check the havoc which is being done. If, however, we solidly fill all the molars with gold and platinum, further mischief will be prevented. For similar reasons it should be employed where, in cases of pyorrhea, it becomes expedient to unite two teeth by a filling extending across from one into the other, covering a platinum bar. The hardest possible filling is desirable in these cases, and is obtainable with this material.

Its manipulation deserves a few words of description by way of caution. In the first place, care must be taken not to tear the surface, as this exposes the platinum, and thus renders it non-cohesive at that point. For the same reason, annealing should be done in a way that will not risk burning off the gold. There are annealing apparatuses which serve very well, or a piece of mica may be used as a tray to carry the foil over the flame before it is cut up. When I am using this material, and I find that it is losing its cohesiveness, I lay on one or two pieces of heavy gold foil, thus producing the cohesive quality in the surface of the filling once more, and then continue with the platinum and gold.

Gold and Tin.—In spite of the high authority for this method, it is one in which I have no faith. In the first place, I think we make a great mistake in searching out as many materials as possible with which to fill teeth. We have now good and reliable filling-materials, which have served us well and will continue to do so, if we patiently and conscientiously apply ourselves to the acquirement of skill. I do occasionally use gold and platinum, and I have indicated where, when, and why I do so. Tin and gold does not appeal to me, because in the first place the want which it is supposed to fill does not in my opinion exist. It is said to last well where gold fails at the gingival margin. I have touched upon this subject before, and here will only state that I think failure at the gingival border is due to faulty manipulation, rather than to material. Certainly I should doubt that tin and gold would succeed where gold had failed. I made the statement once, before an advocate of this method, that I had never inserted a tin and gold filling, but that I had taken out quite a number of them, and they were not of that consistency described in written reports,—that, in fact, they had proven utter failures. The gentleman to whom I am alluding is a prominent and skillful operator, widely known, and has given many clinics upon this method. At this time he was filling a tooth while I looked on. In reply to my remark, he said that if I had taken out tin and gold fillings they must have come from the hands of poor operators, or at least men unskilled in this particular method. Of course to this I could say nothing. The patient for whom he was working was the office assistant of a dentist, a friend of mine, and I had thus a chance to learn the result in this very case. Within one year the tin and gold filling was leaking so badly that the tooth ached, so that it was removed and replaced with gold, which is still doing good service. I believe that a practitioner may be thoroughly successful, and satisfactorily serve all of his patients, without any knowledge whatever of tin and gold in combination.

Gold and Iridium.—This is a combination not manufactured, but procurable upon order. It is a piece of iridium placed between two layers of gold, and then the three rolled into one, producing what looks like heavy gold. It is very hard, and so difficult to manipulate that it barely deserves mention. The gold and platinum will serve every purpose for which this last combination was designed.

How to Condense Gold.—What we term "hand-pressure" is the first principle of packing and condensing gold into a cavity. It has several advantages over malleting, and some distinct disadvantages. Consequently it is rarely proper to depend upon it alone, and I might almost say the same of the exclusive use of the mallet. A dentist should be competent to employ all methods, and discriminating enough to know how to alternate them to advantage. The greatest good gained by hand-pressure is that the gold remains more cohesive under this method than in connection with any other. I am not prepared to discuss the physics of this phenomenon, but it is a fact long ago observed by me clinically, and I have sufficiently tested it to feel safe in making the following dogmatic statement: *The more gradual the pressure exerted upon gold foil in condensing it, the less it loses its quality of cohesiveness; and* vice versa, *the more sudden, sharp, or rapid the blow of the hammer, the less cohesiveness will be exhibited.* This is a very important statement, and being true, once recognized should prove invaluable to the operator. For example, suppose the Bonwill mechanical mallet, with a very rapid stroke, is being used in filling a cavity; suppose that suddenly, seemingly without reason, the gold, piece after piece, refuses to cohere with that already packed. We stop and examine for moisture, but find none. Then we try another and another piece; perhaps they fail, or they may cohere only to come away again after a few pieces have been added. What is to be done? Is it an uncommon experience? I think it will be recognized by many. If the reader, the next time he is in that predicament, will *pack two or three pellets carefully by hand-pressure,* he will possibly be astonished at the fact that they cohere perfectly, and that as soon as the whole surface has been covered with the new gold the mallet may be resumed satisfactorily. This is intelligent alternation of forces. Again, suppose a large cavity, with a comparatively small opening. It is found that before the floor is covered, the mallet seems to have a tendency to induce the filling to leave its retaining-points or grooves. The filling becomes loosened. Again and again this loose piece is removed and the work restarted, but always with the same result. Begin once more, and fill a good portion of the cavity by hand-pressure. After that, continue with the mallet, and all will be well. Suppose that we wish to use large pellets in a large cavity. Every now and again the pellet balls up under the mallet, or only one end of it coheres, so that we tear off and discard the other half. Here is a time when *each large pellet should be partly condensed by hand before the mallet is brought into use.*

The disadvantages of hand-pressure are obvious. It is slow, it is tedious to both patient and operator, and it does not produce as dense a filling. More important still, it is a fact that more teeth have been actually broken by hand-pressure than where judicious use of a mallet has been depended upon. To use a corkscrew plugger by hand in a deep undercut of an incisor, is to invite the fracture of the corner. The slightest twist of the instrument brings so mighty a force against frail structure that the disaster is inevitable. This is a lesson that students should learn theoretically, rather than practically, as I did. It is very unpleasant to try to palliate the offense to the patient. Again, a plugger is more likely to slip by this method than where the mallet is in use. The force exerted is a continuous one, and practically limited only by the resistance. Thus, if the resistance gives way, as when the instrument rests at an improper angle so that it may slide off the tooth, the pressure carries the instrument onward, and does damage. It may be only to tear the dam, or it may be to emerge through the cheek of the patient as I saw happen once, or it may be to pass completely through the guard-finger as occurred to myself. These little accidents, especially like the last, make an enduring impression.

The advantages of malleting gold are unanimously admitted, I believe. The only question remaining is, "What mallet shall we choose?" On this subject I have little to say. It is useless to discuss the merits of various mallets, for as many opinions can be obtained as there are mallets, or men using them. There are a few points in connection with the ones most used to which it may be profitable to allude. I was taught to use the automatic mallet. I was a strong adherent of it for a number of years. I feel satisfied that good work can be done with it,—as good as with any other. But I once had a tooth in my own head filled with it, and have never used it on a patient since. *There is one feature in the ordinary hand-mallet that is not to be found in any other: the patient is connected with the mallet only at the exact moment of contact as the blow is struck.* With all other mallets the patient is practically connected with the instruments behind the mallet all the time. This is especially true with the automatic. What is its action? The point is allowed to rest against the filling, and then pressure is exerted till a released spring causes a blow to be struck. Is it not evident that the whole blow is anticipated by the patient every time? Is it not plain that, to a nervous person, this expectation of the coming stroke must be maddening? It was to me, and I am by no means described by the curious word "nervous," which in fact should read "nerveless." With the electric and with the mechanical mallet it may be argued that the patient is made to feel the mallet only at the moments when the blows are produced, but these occur so frequently that the patient is practically connected with the instrument all the time. Besides, the force which manages the hand-mallet is that magnificent machine made by the Creator, which, without being oiled, runs noiselessly. The powers which control the two mallets mentioned, even when thoroughly oiled, make considerable noise, and produce an answering response from the suffering patient.

I think that the hand-mallet is preferable to all others. I depend upon it whenever I feel that there is necessity for the very best attainable result. Of course it has its limitations. There are places where a man would need three hands,—one for the mallet, one for the plugger, and one for a mouth-mirror with which to reflect light, or with which to see the cavity. For I must deprecate the habit of having an assistant do malleting. I cannot see how two brains can serve as well as one in this instance. Of course one must be ambidextrous to do this, but *all dentists should have the free use of both hands.* I do not hesitate to use my engine with my left hand as quickly as I would with my right. Why children are ever taught to acquire the habit of depending upon one hand, and thus partly losing the use of the other, is one of the mischievous mysteries of civilization. It is one of the follies of fashion. A dentist who cannot use the left hand may acquire its use as I did, by practicing writing at all spare moments. Do not write as one does with the right hand, but reverse it; that is, begin at the right-hand side of the paper and write toward the left, or what we would call backward. This is because whenever we use a muscle a certain impulse to the same end is sent to the fellow of the opposite side, so that our long habit of writing with the right hand has, to a certain extent, educated the muscles of the other hand to the same purpose. When we use the right hand we begin on the left side and move toward the right; therefore, to get the same action from the muscles when we use the left, we must work from right to left. In a short time one can learn to mallet with the right hand, and manage the plugger with the left. This is more satisfactory than depending on the assistant, who may or may not mallet to suit.

Of the power mallets, I prefer the Bonwill mechanical, as being easier to manipulate and more satisfactory in its working. Certainly there are no batteries or motors to keep in order, or add to the noise. The stroke is always under control, either as to speed or force of blow. There is one thing worth mentioning in this connection. When I first obtained a Bonwill mallet, I did so only on trial. I think I was attracted to it because of its ingenuity rather than by any inherent merit which I expected to find in it. I was very much prejudiced against such an instrument. All the argument which I have just used about the connection between the patient and the mallet, I had powerfully before my mind. I tried it conscientiously, however, with the result that by alternating between it and the hand-mallet I obtained an expression of preference from my patients. I think fully ninety per cent. chose the Bonwill. The others were of course those nervous, or nerveless, individuals to whom noise becomes an irritant.

Pluggers to be used.—This is a subject upon which a great deal of discussion has been devoted, and I think largely wasted. The size and shape of a plugger must depend largely upon a man's personal preferences. Instruments with which one man operates beautifully would be worthless to another. Of course, certain mechanical principles can be cited, which theoretically will prove that there is but one form of point that best condenses gold, but in practice a broken instrument is as good as any, in the hands of the skillful. Points that are serrated, or round, or flat, or smooth, or thick, or thin, may either or all be made to produce good results. As to shape, a few varieties are convenient, but I may mention that when I first took the Bonwill I received only one point with it. I used that one point for a year, and though I have bought a few others since, so as not to appear stingy, I rely upon that same point now almost to the exclusion of all others. It is practically universal as a mallet-plugger. The young dentist should endeavor to get along with as few instruments as possible, rather than with many. With a few instruments the workman is the master; with many he is the slave, for he is powerless as soon as one is mislaid.

(To be continued.)

THE RELATIVE VALUES (AS APPLIED TO DENTISTRY) OF NON-COHESIVE AND COHESIVE GOLD, AND A COMBINATION OF THE TWO.

BY DR. I. C. CURTIS, FULTON, N. Y.

(Read before the Union Dental Convention of the Fifth, Sixth, Seventh, and Eighth District Dental Societies of the State of New York, October 29, 1891.)

I WILL preface my few remarks by a quotation from a familiar and popular author on dental practice in his remarks upon the use of gold as a filling-material.

I refer to Dr. J. Foster Flagg, where he says, "It is a work which can be best done by not more than one worker in a thousand; a work which can be well done by not more than one worker in a hundred; a work which is not reasonably well done by more than one worker in ten, and yet a work which is attempted in gold-working dentistry by nine workmen out of ten."

Happy is the one man in the thousand that can best insert a gold plug. To him these remarks are not addressed, but it is for the benefit of the remaining nine hundred and ninety-nine that this article is written.

As far as is known, with gold as first used, and down to a comparatively recent date, no attempt was made to take advantage of its cohesive properties in inserting a plug. In fact, an effort was made by the manufacturers to produce a gold that was uniformly soft.

I think I am correct when I say that to Dr. Robert Arthur is due the credit of bringing prominently before the profession some of the advantages of cohesive over non-cohesive gold. Dr. Arthur published a small volume on the subject in the year 1856 or thereabout, which had at that time a wide circulation, and did much to revolutionize dental practice, and since that time down to a very few years a fierce war has been waged between non-cohesive and cohesive workers. Reams of paper and rivers of ink have been used, and the result has been that the conservative worker has selected the good part from each side, the one class conceding that for restoring contour, cohesive was best, and the other that with frail walls and at the cervical margins non-cohesive gold could be forced into the interstices with less danger of fracture or mechanical disintegration of the margins of the cavity; and to-day many of the best workers use non-cohesive gold at the cervical walls and the body of the cavity, finishing the filling and restoring the contour with cohesive, making a combination that is at times very desirable.

I wish to state here that I do not refer to restoring broken corners or building down teeth, for in all such cases cohesive gold is the material that must be used, but do refer in a general way to all other classes and modifications, with a few exceptions.

At the risk of being called egotistical, I will explain the plan that has given me the most satisfaction, and resulted in the fewest failures; and as no advice is valuable that is not based upon experience, and as we profit most by our failures, let it be assumed at the beginning that I have had my share of failures, and belong to Dr. Flagg's nine hundred and ninety-nine.

For convenience, we will divide the cavities we find into five classes:

1. Small ones the size of a pin's head and a little larger.
2. Those with corners or whole parts to be restored.
3. Approximal cavities in the anterior teeth.
4. Approximal cavities in the bicuspids and molars.
5. Cavities upon the labial surfaces of incisors and cuspids, and the buccal surfaces of molars.

In the first and second classes the almost uniform results have been in favor of cohesive gold through the entire operation, and it is not my province at this time to enter into detail as to its manipulations. Each operator is presumed to have a plan that is peculiarly adapted to himself.

In the third class referred to, namely, those upon the approximal surfaces of incisors and cuspids, the plan I have adopted (after separation) is to shape the cavity so that there will be an undercut at both extremities of the cavity; beveling both lingual and labial edges, not depending upon the last two for the retention of the plug to be inserted. After the cavity is prepared, I then take the proper size piece of No. 4 soft foil, and fold it into a ribbon that is one-third wider than the long diameter of the cavity; then take a small instrument, say a broken excavator, and roll into a cylinder (do not roll too closely). Experience will tell you how much gold you will require for the cylinder. It will vary in different cases from one-fifth to a whole sheet or more. (I prefer these cylinders to any found in the depots.)

It is presumed that the dam is applied. You will then insert the cylinder into the cavity, forcing it up at the cervical margin, and allow it to protrude both at the cervical and lingual margins, forcing it into the undercuts at each end of the cavity, making a sort of basket of gold in your cavity; then begin with cohesive gold at the cervical, and finish the cavity with it, and at the last condense the whole with foot-shaped pluggers and finish in the usual manner.

In the fourth class, viz, approximals between bicuspids and molars, if the grinding-surface is not weakened or gone, I would pursue the same plan as in the incisors ; but if it were a compound cavity, I should depend for retention upon the lateral walls as well as the cervical, inserting the cylinder or cylinders with the end looking toward the adjoining tooth, letting it protrude, making my basket as usual, and finishing with cohesive gold, condensing thoroughly wherever the soft gold came to the surface, and finishing with disks and tape.

In the fifth and last class referred to, those upon the labial surfaces of incisors and cuspids, and upon the buccal surfaces of molars, it has been my practice to bevel the edges as far as practicable throughout the whole margin, making an undercut all the way around with wheel-shaped burs, and insert a cylinder upon end, one that would protrude from one-third to one-half its length beyond the cavity, and then make a cavity in the cylinder, forcing the soft gold into the undercut and filling the cavity thus formed with cohesive foil, and at last condensing the whole with foot-shaped points (as it were to head down a rivet), finishing with stones, etc.

One danger there will be to the beginner in this method, and that will be, the cylinders will not be made of a proper size. They will either be too large to be inserted, or so small that they will not be retained in place.

The one great object to be attained in any filling, except the restoration of contour, is to perfectly adapt the gold to the margins of the cavity ; and there is no one that will attempt to gainsay the fact that the softer the gold the more easily it can be adapted to the walls and edges, and after the filling is inserted, the protruding ends of the cylinder can be malleted or burnished down with far less danger to the edges of the cavity. No operation is stronger than its weakest spot, and in a vast majority of cases the danger line is at the cervical border. In fillings inserted wholly of cohesive gold the trouble is not in regard to their coming out, but the danger of not making a perfect and tight joint at the cervical and lingual borders.

All fillings are in a measure like a rivet, and there can be no better comparison than this fact : that all iron-workers use a rivet of as soft iron as is possible consistent with the strength required. A steel rivet, though much stronger, does not adapt itself nearly as easily as one of soft iron ; and, as one writer upon the subject of cohesive and non-cohesive gold expresses himself in regard to burnishing cohesive gold to adapt it to the borders of the cavity, "one might as well try to burnish down a piece of cast iron."

To you who do not agree with me in my system of work, I would say, there may be honest differences of opinion. We all have our own peculiar systems and modes of procedure, and were I to have discussed this from your standpoint you would have been bored and not gained one single idea. Neither do I expect you to adopt this plan, for your habits are fixed ; but to the young men who are just entering the profession, and to the few of my fellow-workers who have like me met with failures, I would heartily commend this plan ; and if this article shall but provoke sharp discussion I shall feel amply repaid, realizing that I am not too old to learn.

BORDERS BETWEEN THE NATURAL AND ARTIFICIAL IN CROWN- AND BRIDGE-WORK.

BY CALVIN S. CASE, M.D., D.D.S., JACKSON, MICH.

(Read before the Anniversary Meeting of the First District Dental Society of the State of New York, January 18, 1892.)

THAT part of dentistry which has for its object the attachment of artificial dentures to crowns and roots of natural teeth is old enough for us to judge of the value of methods, and to intelligently discuss features of the operation which will have the greatest influence in securing for it permanency and continued healthfulness of adjacent tissues.

Notwithstanding the fact that almost every educated dentist claims to possess sufficient skill to at least properly prepare a root, fit a band, and set a finished crown, I believe there is no part of our practice where the advantages of mechanical perfection in the fine adjustment of artificial to natural parts are so persistently and willfully ignored. This is largely due to the fact that an artificial crown can be made to present a pleasing appearance, and to a casual observer possess all the requisites of firmness and permanency, yet with the gum innocently concealing a cause that must surely result in total failure.

The profession is very decided in her rules relative to the finish of fillings, and quick to manifest disapproval of an operation that leaves overlapping edges of gold at cervical borders, even though lying far beneath the margin of the gum. But how is it in regard to the free edge of a band for an artificial crown? Does anything like the same anxiety arise relative to perfection of joint and finish?

In many instances, it would seem in this particular that the only aim was to produce an artificial crown that would not immediately loosen and come off, with little or no regard for conditions that are considered exceedingly important and necessary at the cervical borders of fillings.

In proof of this, look at the turgid condition of the gums above a large proportion of crowns and bridge dentures that have been worn a year or longer. When an instrument is passed along the edge of such bands, can you turn away from such an operation without a blush that this is called dentistry? and not infrequently from the hands of one who ranks high in the profession!

It will be the purpose of this paper to present certain principles relative to the construction and fitting of band-extensions to artificial crowns, with the hope of stimulating efforts for greater perfection and a higher appreciation of its demands.

In this connection I shall endeavor to describe a course of procedure for this part of the operation of crowning,—which was casually mentioned by me in a paper read before the thirtieth annual meeting of the American Dental Association,—believing, after much experience with other methods, that it possesses elements in its favor not easily attained in any other way; and if followed in detail, will enable a skillful operator to most nearly approach that perfection of the operation so necessary to the continued healthfulness of sensitive living tissues in contact with the band.

As it is impossible at best to obtain the same perfection of adjustment and finish at the edge of a band as at the margins of fillings, its relative position to the free margin of the gum is a matter of no small importance as having influence directly in producing irritation and inflammation of adjoining tissues, or as serving as a means for retaining decaying food and secretions, causing disease and ultimate failure.

A number of leading dentists have claimed that a band should be extended to, but not beneath, the free margin of the gum.

While this would have many advantages, it is rarely possible with porcelain-front crowns, and in all instances where it is necessary to inclose portions of the root broken down by decay; and if the band is extended only at these places, it seems to me that more danger will arise at points where it emerges from the gum than will occur if it continues around the root sufficiently far beneath the gum to prevent the lodgment of *débris* along its border.

Further: in those cases where it is possible to regulate the relative position of the free edge of the band on teeth back of the first bicuspids, to be used for crowns or bridge-piers, I would advise that there be an appreciable distance between the band and the gum-margin, and in these instances to remove only so much of the enamel from the sides of the tooth as to produce a sufficiently long and rigid bearing to the crown. This will permit the operator to finish the edge of the band against smooth enamel surfaces with hardly a perceptible shoulder, and, what is of greater importance, the patient will be able to keep it clean.

Where a band for an artificial crown extends beneath the free margin of the gum, it should be thin and perfectly finished at the edge before adjustment, and made of material which can be easily burnished into all the inequalities of the root.

I believe the main fault in this class of crown-work is in making the band too thick, and of such rigid material—with a view of adding strength and durability to the work—that it is impossible to properly fit and finish it after the crown has been placed in position.

I have heard the argument: that the root should be shaped conically, so that when the band is *driven* on, it will be stretched to a close joint at the edge. This is theoretically possible, but not often accomplished in practice with posterior teeth. With the most careful operation, projecting edges will often be left at one or more points, which, with the natural depressions across which the band must inevitably span,—*if not subsequently fitted*,—will leave irritating edges, V-shaped spaces, and all the evils so prevalent and discouraging that follow.

More successful results would be accomplished if it was more often considered that the principal object of a band is to prevent failure of the crown by protecting the root and adjacent tissues from disease, and that sufficient added stability could be given to the completed crown by a proper construction and fitting of the post.

For the latter I prefer round clasp-metal wire (Nos. 18 and 19, E. S. G.), because of its great rigidity and strength; and I endeavor to fit it in the reamed canal with as close a joint as will allow for the setting of the crown.

Where it is possible, by closely fitting the post its entire length into a socket in the root, I not only obtain great stability for the crown, but prevent its lateral movement during the process of finally burnishing the band against the sides of the root. And further, it is a well-known property of the oxyphosphate cement that it clings with far greater tenacity between close-jointed surfaces than when a wide space is left to be filled with it.

I am decidedly in favor of the use of pure gold for bands. It possesses important qualities not equaled by any of its alloys, and, if properly manipulated, no mechanical difficulties will arise in its use, as I shall endeavor to show.

The objections to it have always arisen from attempts to use it in the ordinary way of using coin or other rigid gold alloys; which is to obtain a measurement of the root with wire for the length of the band, which is cut, soldered, and then fitted by bending with pliers.

While, even with this method, pure gold is preferred by many, twenty-eight or twenty-nine gauge is found to be so exceedingly soft when annealed by the soldering process, and so easily bent and stretched in fitting, that it is at once abandoned by a majority of operators, like thousands of superior things that are "born to blush unseen," because of the unwillingness of men to abandon familiar ways and follow in detail other methods which would insure a successful and accurate result, even though its deviation from beaten paths presents difficulties of no special moment, requiring only the same degree of skill.

In order to use pure gold for a band most successfully, it should be made upon a form of the root. It is not strange that so many object to the use of forms, considering the amount of time and trouble that is usually expended in an attempt to make that which should require but ten or fifteen minutes. They often select a piece of wood that is inappropriate and several times too large, and then laboriously proceed to cut a tenon having a broad shoulder similar to a cabinet fitting. If, instead, they would procure a hickory whip-stalk at a harness store and cut it into pieces six or eight inches long, they would have material from which might be selected a piece that would require but a few strokes of the file to reduce to the proper size and shape.

The advantages of a form are, first, after the band has been soldered, one is enabled to place it on a form the exact shape of the root and burnish it to perfect and sufficient rigidity; second, if the band has been cut too short, it can be easily stretched over the form, without subjecting the patient to the painful operation of fitting at the chair, which also is often exceedingly annoying to the operator and a waste of time; third, after the gum-margin line has been determined and the free edge of the band cut parallel to it, it can be reversed on the form, which holds it firmly in shape while the edge is being filed thin and finished; fourth, if at this time the band or ferrule is found to be too large, it can be readily made smaller by reducing the size of the form, replacing the annealed band upon it, and drawing a broad-bladed burnisher over its surface between the thumb and finger, which firmly grasps and holds its loose portion so that the molecules of the metal are driven together by pressure from the tool. (I may add here, the facility with which this can be accomplished with pure gold, even after the face-plate has been soldered on or the crown finished, and also the ease with which it can be burnished to perfectly fit the root, are advantages not equally possessed by any other grade of gold); fifth, after the band for a porcelain-front crown has been placed upon the root and the line of the gum-margin marked on its outer surface, it can be replaced upon the form, which, with the band, is cut to conform to the desired shape of the cap. I now fit and solder the face-plate, using very thin platinum (No. 32, E. S. G.), and believe that I am greatly aided by the form; sixth, as the mechanical work is done almost entirely upon the form, the ease with which the frail piece may be handled, filed, burnished, and finally finished without danger of bending it or destroying its shape, makes the form an implement, in my estimation, of inestimable value.

FIG. 1.

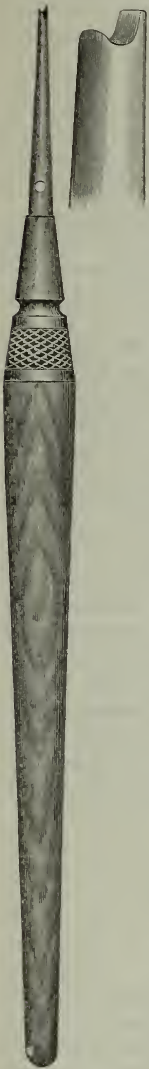

Fig. 1 represents instrument for forming loop and inserting it around the root.

FIG. 2.

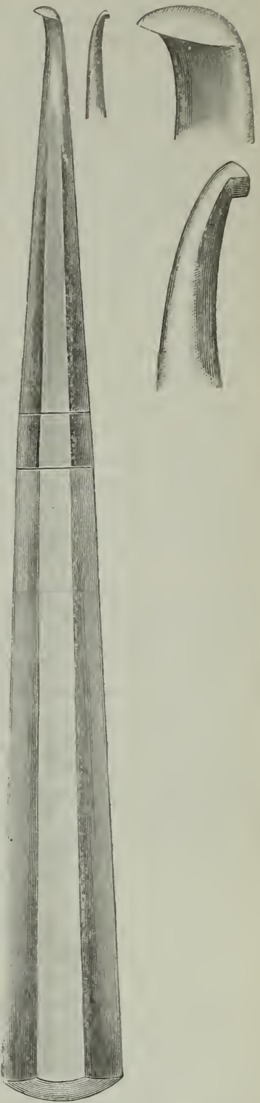

Fig. 2 is a fair representation of the point of one of a set of four enamel-cleavers, which are so constructed as to reach the enamel of any root in the mouth.

For taking a measurement or pattern for a form of the root, after it is prepared, I prefer surgeon's silver suture wire (No. 26 or 27), because there is not that recoil of the loop upon its removal from the root that will occur with soft iron or copper wire. This is of no importance when the loop is to be cut, but a very desirable quality for purposes of a pattern for a form which is intended to represent the shape as well as the size of the root.

The ductility and rigidity of silver are favorable qualities for this purpose. It can be easily stretched, and in bending will retain any shape given it.

I first form a loop of the wire around a conical-shaped wooden handle (see Fig. 1), by quickly twisting the ends together with my fingers, with a view of making it slightly smaller than the root to be crowned. After giving to it approximately the desired shape, I place it against the end of the root, when I can at once see if it is too large or small, and change the size by twisting it to a smaller place upon the handle or by forcing it farther along. The loop is now held by the twisted ends in one hand, and with an instrument (Fig. 1) in the other which is grooved at the end to fit the wire (one lip of which is a little the longer) it is first placed partly around the root, and the remaining portion forced out and over the peripheral edge.

If anyone who has found the operation a difficult one with binder's wire where the root is broken down by decay and submerged beneath overhanging gum, will try this method, I feel confident he will be pleased with it.

I cannot leave this subject without a few words relative to instruments for removing the enamel preparatory to crowning; for upon this particular operation hinges the possibility of obtaining that perfection of joint so eminently desirable.

Without considering those impractical affairs called "root-trimmers," intended for this purpose, the instruments that are used most, in fact the only ones that I know of in the market of any practical value, are certain forms of scalers, which are tempered properly no doubt for the removal of salivary calculus, but are not calculated for cutting and cleaving enamel when its removal is at all difficult.

If enamel is cracked and fissured, it can be easily cleaved from its attachment to the dentine; but if a large portion is unbroken in its integrity, its removal is a matter of no small difficulty with an instrument that is incapable of first disintegrating it.

In order to produce the most effective enamel-cleaver, there are certain principles that must be observed by the maker, and to which form, for convenience of use, should always be subservient. First, it should possess a temper that will take hold of the hardest and smoothest enamel surface in the same way that a diamond takes hold of glass; second, for this purpose the blade should possess sufficient body to allow bringing to the highest possible temper without burning the steel, and afterward to permit use without fracturing the cutting-edges or point; third, the necessity of having the blade sufficiently small to pass readily beneath the margin of the gum also necessitates that it be well sustained upon a strong neck, to prevent breaking, especially as in the form I suggest it is impossible to draw the temper of the latter without destroying the effectiveness of the cutting-edge.

I would advise that it be so shaped (see Fig. 2) that it can be partially rotated under the margin of the gum to present a sharp point toward portions of enamel that will not easily cleave off, with a view of fracturing it as a diamond cuts glass, breaking it up into small sections that can then be quickly detached and the sides straightened and smoothed by the broad blade of the instrument.

CORRESPONDENCE.

To the Editor of the Dental Cosmos:

The paper read before the First District Dental Society of New York, on January 18, and published in the Dental Cosmos for February, called forth some discussion and criticism. To the latter a few words in response will not, I trust, be out of place, in advance of the papers which are to follow.

The fact of which Dr. Heitzmann complained, that Professor Louis Agassiz's name had been omitted from the list of those who had been prominent in solving the problem of the derivation of species, is in no sense to be construed into an assumption that his services in favor of the theory have not been fully appreciated by both his colaborers and subsequent workers, as is well attested by the following from Professor Joseph LeConte's work, "Evolution and its Relation to Religious Thought:" "The greatest result of Louis Agassiz's life-work was in showing the close resemblance between the stages of embryonic development and those of the development of the organic kingdom; and that to him more than any other man is due the credit of having established the laws of succession of living forms in the geological history of the earth,—laws upon which must rest any true theory of evolution." But while he believed that the embryonic development is a natural process, he was unwilling to accept the development of the organic kingdom,—the succession of animals,—as anything less than a supernatural process. According to the evolutionists, or transformists, all organic groups, whether species, genera, families, orders, classes, or varieties, are variable, and when favored by certain conditions these variations accumulating in one direction gradually produce new forms. According to Agassiz, the higher groups, such as species, genera, families, orders, etc., varied, but only through the introduction of new species by a supernatural process; substitution rather than transmutation. He believed no more in the transmutation of species than in the transmutation of metals. The origin of species by "special act of creation" was Agassiz's belief, while the transformists believe in the origin of species by "descent with modification" under favorable conditions, "each stage in development being the result of the immediately preceding stage," the law of continuity holding good here as in every other department of nature.

The criticism upon the use of the term transformation or transformism instead of evolution, with the effort to sustain it by numerous illustrations, evidenced in Dr. Dodge a want of appreciation of the laws governing the modification of structures. In stating that the trend was always upward from the simple to the more complex, and hence evolution was the preferable term, was just where he erred. Many animals are, by accident or the unexpected, placed in a less favorable condition. In such the tendency is constantly of adaptation to environment, and not necessarily to a higher position. In the reproduction of every being there are two somewhat contradictory laws operating upon it,—Heredity and Variation,—an effort to be like the parent, and at the same time to vary from the parent and from other progeny of the same parent. Supposing the progeny are thrown into a less favorable condition than the parent, then the beings capable of adapting themselves to the trials and vicissitudes of the less favorable condition are the ones surviving, though they may be far inferior in some respects to their associates and the unfortunates. Take, for instance, the various progressive stages of the tape-worm (Tænia solium); its numerous changes from its maternal vesicle until it becomes matured and fixed in the human alimentary canal are not by any means evidence of an upward tendency. The same is true of numerous parasites, in which the trend is downward and not upward; they are transformed, but not evolved, in the sense in which Dr. Dodge interprets the term. The same may be said of many atrophied and in some instances aborted organs, which were functional at one time in the history of the ancestors of the animals now possessing them as rudiments, but which, on account of some change in the habits of the animal, became no longer useful, and consequently by disuse gradually became smaller and smaller until they are finally simple rudiments. The animal in losing the organ or organs was not necessarily evolved or elevated, but simply transformed. For an illustration take the boa-constrictor and other reptiles, which were formerly possessed of legs, but from some change in habits or environment acquired creeping as a means of locomotion, and legs became useless. Was this evolution or transformation?

Again, take the splint bones of the horse's foot. Fossils prove without question that these are remnants of toes, previously well developed and functional in the ancestral horse, but in the modern horse they have become atrophied, indeed almost aborted. Which is the better term to indicate the change,—evolved or transformed? Animals having lived in sunlight, when changed to localities where darkness prevails, in time lose the sight, and the eye—the organ itself—becomes impaired: no evolution here, but retrogression. The Balenide or great whale has no teeth, the huge baleen plates serving the purpose thereof; yet teeth were in the embryo before birth, and also in the not distant ancestor, probably. This same animal doubtless was once a terrestrial mammal, but its great size and weight forced it to the water, which was followed by loss of legs and feet with fins substituted. The change was not evolution, but transformation. In the same manner we might continue, and name a multitude of instances where there was change in response to environment,—a change which was a gain to the animal by placing it in harmony with its environment, but compared with more complex creatures having greater nervous energy it was certainly a retrograde metamorphosis.

Dr. Dodge referred also with some feeling and energy to those who thought the human family were becoming deficient in the third molars, and tabooed the subject as one not sustained by facts or worthy of consideration. I would ask the doctor, at his leisure, to visit some museum in which there is a good array of human skulls and critically examine the most ancient, or those which may be considered the lower races. In these let him note, first, the space between the distal surface of this, the third molar, and the base of the coronoid process; second, let him note the size of the third molar, and see whether it is not fully as large as either the first or second molar; then in the five hundred or one thousand skulls examined let him next note how many or what per cent. there are wherein the third molar has never been erupted. Having done this, let him next select a church embracing a thousand of the most cultured people of New York city, and note the same localities and characteristics,—the aborted spaces, the teeth reduced or suppressed in size, and those entirely absent. Or, if this is impracticable, I would suggest he keep a record for two or three years, or longer time, of all the mouths coming under his care, recording his observations of the same parts. If he will do this carefully and conscientiously, and does not change his views at the end of the third year, I shall be greatly disappointed, and be inclined to admit that conclusions drawn have not been well founded. But feeling assured the doctor will have modified his views with this experience, in order to strengthen and induce a greater divergence from his present holding, I would invite him then to study the law of specialization of animals, and especially with reference to the food-habit, and see if he cannot discover that as they become fixed in habits and improved in intelligence or nervous energy, especially the latter, whether the tendency has not been, and is not at the present time, toward the shortening of the jaw and reduction in the number of teeth.' A single well-recognized illustration may be given, from the ordinary draught-horse to the thoroughbred,—teeth reduced from forty-four (typical number) to forty, four teeth having become suppressed in development, or aborted. I know the answer may come that these are lower animals, and not of the human family. True, but in our discussion we have to do with the physical, the animal. Man's relation to nature must be regarded much in the light of any other animal. He, in common with them, is but a part of nature, and if viewed with reference to numbers or animal traits, a very insignificant part. "He has no world of his own, or even kingdom of his own; he belongs to the animal kingdom. In that kingdom he has no department of his own; he is a vertebrate. In the department of vertebrates he has no privileged class of his own; he is a mammal. In the class of mammals he has no titled order of his own; he is a primate, and shares his primacy with the apes. It is doubtful if he may enjoy the privacy of a family of his own,—the Hominidæ,—for the structural differences between man and the anthropoid apes are probably not so great as between the sheep family and the deer family." *

C. N. PEIRCE, D.D.S.

TRANSLATION.

PENTAL (C_5H_{10}) AS AN ANESTHETIC.

TRANSLATED BY WILLIAM LOMBARDINO, D.M.D., BERLIN, GER.

(Read before the Dental Section of the Society of Natural Science and Physicians in Halle-on-the-Saale, 1891, by Prof. Dr. L. HOLLAENDER.)

IT is well known that all the narcotics employed to produce general anesthesia were first used by dentists, or administered in the extraction of teeth. This is true not only of nitrous oxide, the oldest, but also of ether, chloroform, chloromethyl, ethylidene chloride, and ethyl bromide. This is all the more remarkable because the administration must be suspended during the extraction of the teeth; consequently the power of the anesthesia is not shown to its fullest extent. Moreover, the accompanying dangers are increased instead of lessened on account of (in most cases) the sitting position of the patient.

The reason for this history is probably the fact that patients for extractions are more easily had; and, as that operation is so painful, if insensibility to the pain it causes is secured, then the same immunity may be expected to occur in major operations.

Another substance, amylene, as well as those above mentioned, was formerly used very extensively for the extraction of teeth. It was first prepared by Cahours from amyl alcohol, and was described by Balard in 1844. In 1856, Snow described its anesthetic effect in the

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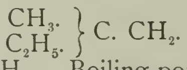
* LeConte.

extraction of teeth (*Lancet*, 1856, No. 26), and in 1857 many successful results were reported from its use, especially in operations of short duration. Among the more valuable communications were those of Spielberger and Lohmeyer (*Deutsche Klinik*, 1857, No. 20), Tourdes (*Gazette de Strassbourg*, 1857, p. 323), Egger and Petry, (*Wiener Klinischer Wochenschrift*, 1857, No. 28), and Robert (*Bulletin de Thérapie*, 1857, No. 52). While Tourdes preferred to describe his experiments upon animals, Robert communicated the results of his experiments upon the human being, and at the same time compared the effects of amylene to those of ether and chloroform. Although it is not quite evident which of the preparations he used in operating, still his experiences agree exactly, and especially with the facts which I observed, that with complete insensibility, in most cases consciousness remains, but the power of action is restricted or completely suspended. The mere vanishing of sensibility with full consciousness was not observed. All these statements date from the years 1856 and 1857, but by 1858 nothing more was heard about amylene. Pfefferman merely mentions amylene in his book entitled "General Dentistry," 1862, in which he states that he produced narcosis with it "hundreds, if not thousands," of times; but he did not describe its properties or state where it could be obtained. His descriptions are merely extracts from the above-mentioned authors, and he makes no communications regarding his own observations.

As nothing has been said regarding amylene in scientific journals since 1858, it may be taken for granted that the poor quality of the drug produced unsatisfactory results, and accordingly it was abandoned. The earlier amylene preparations were obtained by the action of a dehydrating agent, such as chloride of zinc or anhydrous phosphoric acid, upon amyl alcohol (fusel oil). In consequence divers preparations were produced, containing a mixture of different compounds, besides being contaminated with amyl alcohol. All these preparations emit dangerous and suffocating vapors; their point of ebullition is inconstant, ranging between 28° and 75° C., or still higher; besides, the odor is very unpleasant, being somewhat similar to that of decomposed cabbage or cat-urine. The following is a list of preparations obtained by one of the earlier methods, the action of a dehydrating agent upon fusel oil:

1. Trimethyl-ethylene (Pental) β—also called Isoamylene. $(CH_3)_2$ C. CH. CH_3. Boiling point 38° C.

2. α-Amylene (Propylethylene). C_3H_7. CH. CH_2. Boiling point 37° C.

3. γ-Amylene. 

$$\left.\begin{matrix} CH_3. \\ C_2H_5. \end{matrix}\right\} C.\ CH_2.$$

Boiling point 38° C.

4. Pentane. C_5H_{12}. Boiling point 29° C.

5. Polymere amylene, *e.g.*, Diamylene. Boiling point 156° C.

The present amylene is manufactured at C. A. Kahlbaum's chemical laboratory in Berlin, at the request of Professor von Mering, and is for sale on the market under the name of Pental. The same is not prepared from amyl alcohol, but is obtained from amylene hydrate through heating with acids; the result being an entirely pure tertiary amylene, which has a constant boiling point of 38° C. It is a colorless liquid, with a low specific gravity, 16 cubic c.m. weighing about 10.0 gr. It burns with a bright flame, and can be inhaled without injury to the membranes of the mouth and air-passages. It is insoluble in water, but mixes readily in any proportion with alcohol, chloroform, and ether. It is also as inflammable as the latter, and for this reason it must not be brought into contact with a flame. Being exceedingly volatile, ice-crystals form rapidly on the inhaling mask, as in bromide of ether administration. It does not, however, decompose on exposure to the air and sunlight, and it is therefore not necessary to keep it in dark bottles and protect it from the air.

In beginning the use of pental, I administered it with the common inhaling mask, and as a rule, it took from fifty to sixty or ninety seconds until the patient was anesthetized. The corneal reflex does not entirely disappear during this time, while with some, whether they inhale with open or closed eyelids, the pupil either contracts or expands. With quiet persons who breathe regularly, anesthesia takes place more quickly, while those who are excited and anemic, and will not or cannot inhale quietly, require a longer time, the same as with other anesthetic agents. The anesthetized patient sometimes presents a curious picture: while the color of the face remains unaltered, the eyes remain wide open even when under the influence of the narcotic or when told to close them on administering the anesthetic, sometimes also when pressed down with the finger.

The anesthesia comes on gradually, without any previous conspicuous symptoms whatever. The quickened pulse at the beginning soon returns to its normal state, but notwithstanding that the sensibility vanishes, consciousness in most cases partially remains. Under the profoundest narcosis, the patients when requested will open the jaws, even though they were firmly closed before; but although they look at the operator with wide-open eyes, still they are unaware of what is being done with them. While slowly returning to full consciousness, they are yet so insensible that one can proceed with the operation. I never noticed any contraction of single muscles such as those of the jaws and fingers, as is the case under bromide of ether; but I observed one case of cyanosis, that of a woman in advanced pregnancy, who did not loosen her underwear properly. Contrary to rule with ethyl bromide anesthesia, the return to consciousness is quite gradual.

Neither during the anesthesia nor after is there any disagreeable feeling, such as nausea, headache, etc. The agreeable feeling of all, or at least nearly all patients after the narcosis, is something astonishing. Many patients, who upon inhaling complained of a headache and for this reason hesitated about taking it, afterward said that the headache had entirely disappeared. In administering pental, I never observed any syncope or depression of the chest, which at times occurs in using chloroform and ethyl bromide, and accordingly I have administered it to children from four to ten years of age, and to old people from fifty to sixty, with the same results.

The least excitement is extraordinarily uncommon, and the difference from the exciting stage of chloroform and ethyl bromide is readily shown, in that the patient is always animated in a friendly, cheerful way. Some patients begin to laugh heartily, so that pental could readily be termed laughing ether (Lachäther).

In contrast with ethyl bromide narcosis, the anesthesia may be prolonged as desired, but this is nevertheless very difficult in teeth-extractions, because, as before mentioned, while operating, the administration must be discontinued on account of the sitting position of the patient. In operations on other parts of the body, where the patient can be placed in a reclining posture, the narcosis will prove very satisfactory.

The effects are not weakened by administering the anesthetic more than once in succession. On the contrary, it seems as though the second narcosis takes place more rapidly.

In general, I wish to state that pental anesthesia differs from chloroform in that it takes place more rapidly, and no ill effects are afterward experienced ; from that of ethyl bromide, in that the narcosis is somewhat slower, but lasts longer and can be continued according to wish. Since pure pental consists of carburetted hydrogen gas and is free from the halogen elements, its absolute harmlessness and the non-appearance of disagreeable after-effects may well be understood. I could not observe any effect upon the action of the heart or respiration.

The only disadvantage is the peculiar penetrating odor, which reminds one of mustard oil ; therefore it is more unpleasant than chloroform and ethyl bromide. This, however, is of no consequence.

The rules and precautions in administering pental are the same as for all other anesthetics : the removal of all apparel which impedes free breathing, quiet, and not too much light in the room. Nervous and physically infirm individuals require more of the narcotic than placid and robust people who respire without the least fear. In the case of a single extraction, it is not necessary to wait for the disappearance of the corneal reflex, as it sometimes occurs rapidly and at times very slowly ; but in operations of longer duration it is advisable to wait. It is not always possible to say when the anesthesia is complete, which occasions some little difficulty at the outset. Even though the raised hand should not fall back powerless, the anesthesia may have taken place ; and as the corneal reflex remains rather long, this symptom is no guide. In general, I go according to my own feeling, and the staring look of the open eyes, or the disappearance of the corneal reflex.

As before said, I at first administered pental with the common inhaling mask, but soon discovered that a considerable quantity of the agent was lost, because the light, mobile liquid trickled through the mask, wetting the neck and throat. As a consequence, the mask had to be changed several times in the same anesthesia. Latterly I have made use of an improvement on Junker's inhaling mask with success. Formerly I was obliged to use from 25 to 30 cubic cm. for each anesthesia, but with the improved apparatus only from 10 to 12 cubic cm. is required,—a matter to be considered, as pental costs six dollars and a half per kilo (two pounds). Through this method of administering, also, the disagreeable odor of the pental partly disappears, and the anesthesia takes place in about forty to forty-five seconds.

Considering the advantages of pental, as observed in my use of it, as compared with ethyl bromide, I would state that in general, pental is more reliable, that it never fails to produce anesthesia, which also lasts much longer ; that disagreeable after-effects are extraordinarily uncommon ; and that the administration of the drug in large quantities seems to be absolutely free from danger. The greater expense of the pental is entirely equalized in that I am able, since using the improved Junker mask, to induce anesthesia in from fifty to fifty-two cases, and with one kilo; some of these can be of long duration.

Further experience must prove whether these facts as observed by me will be corroborated by others. No doubt it would be advisable to experiment and find out how pental acts upon the blood and urine in the body; perhaps, also, it might be well to test for sugar. These points, if known, would disclose what becomes of the decomposition products of the compound, but as my time was limited and urinary analysis is somewhat difficult to carry out on dental clinical patients, I think the extraordinarily successful results of more than two hundred anesthesias on the human subject will suffice to indicate the value of the agent.

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PROCEEDINGS OF DENTAL SOCIETIES.

TWENTY-THIRD ANNIVERSARY MEETING OF THE FIRST DISTRICT DENTAL SOCIETY OF THE STATE OF NEW YORK.

First Session.

The meeting was held in the amphitheater of the New York Academy of Medicine, January 18, 19, and 20, 1892, and was called to order Monday, January 18, at eight o'clock P.M., by the president, Dr. Norman W. Kingsley.

The president made an address of welcome in the name of the society, which was responded to by Dr. J. Y. Crawford, of Nashville, Tenn., on behalf of the visitors from other cities.

Dr. Ottolengui stated that it had been the earnest desire of the executive committee to have the program carried out as announced, but the prevailing disease, which in one day had carried off three of the world's most illustrious inhabitants, had prevented several of the gentlemen who were expected to take an active part in the proceedings from being present. The names of Drs. Kirk and Taft were here mentioned. Drs. Patterson and Fillebrown were unable to attend on account of family bereavement.

The president introduced the first essayist, Professor C. N. Peirce, of Philadelphia, Pa., who read a paper, the subject of which was "Some Thoughts on Transformism." *

Discussion.

Professor Carl Heitzmann. It is a strange thing that no discovery, be it ever so great, springs up suddenly out of the brains of a single man. There is always a series of forerunners who, in a certain line of thought, have anticipated such discoveries, and so it is with the doctrine of evolution or transformism of Charles Darwin. What is the distinguishing point between Darwin and Geoffrey St. Hilaire, Goethe and Lamarck? Even Schopenhauer anticipated the doctrine of evolution, and still why do we attribute it to Charles Darwin himself? There is a difference between speculation and conclusion. The facts upon which ingenious speculations of the named men were drawn were not sufficient to admit of absolute proof. This positive conclusion was at last drawn by Darwin, and it is the enormous sum of his observations that made him immortal.

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* Printed in full in the Dental Cosmos for February, page 85.

The essayist has forgotten to mention an American observer,—Agassiz, of Boston. This man, within our days, declared that he was strictly opposed to Charles Darwin's views.

Those of us who are not too pious will admit that there is the utmost probability in Charles Darwin's doctrine. He was not loth to admit that the origin of man was an unsettled point, and his views induced another great observer, Virchow, of Berlin, whose seventieth birthday we celebrated last year, to warn us against speculations and urge upon us facts and conclusions only. Do not draw conclusions too peremptorily. We have no positive right to conclude that man is the outcome of the ape. It is *not* proven yet. Perhaps Haeckel was right in maintaining this; perhaps he is too idealistic and went too far ahead in his speculations.

Gentlemen, there is, as the president has remarked, scarcely a more interesting topic than this theory of evolution or transformism. I myself have studied it for thirty-two years with the microscope; that is, with an instrument which enables us to make fine observations, and approaches the possibility of showing to us some of the marvelous and apparently insoluble processes of nature.

Take ourselves,—man. What are we originally? Take an oak tree, for instance; what is that? A little bit of a thing, at first; compare the ovum with the adult; watch the seed, and the plant, and the whole of the manner of their evolution. We can hardly follow this complicated process. Look into the ovum, and you will be amazed to see a very complicated structure, which we call the structure of protoplasm. There we have a mass which we call the yolk, made up of a reticular structure of living matter. In its center is the vesicula and macula germinativa,—the future man or woman. The structure of the spermatozoids, the male element of fructification, is scarcely visible except under very strong microscopical powers; there is also a reticular structure which I claim to be the living matter proper. This structure is now shown in photo-micrographs. Although extremely small, the two elements, the ovum of the female and the spermatozoids of the male, come in contact and mix together. From the moment this occurs, a peculiar growth commences in the ovum. The ovum splits into halves, the halves into fourths, and so on, until a large number—millions—of so-called cells have arisen. In previous years it was the favorite idea of many microscopists to call the ovum a cell, and to call all outcomes the halves, and again the fourths, the sixteenths, etc., whereas I have shown that all these halves remain interconnected by means of delicate threads, and even the first elements are interconnected with one another by such minute threads. To say, therefore, that individual cells are an outcome of the segmentation is a mistake.

Quite recently I have made studies of a human embryo three to four weeks old, the thighs of which were just budding forth. We made sections of these, and saw nothing but a group of perfectly indifferent corpuscles, about which you could not distinguish anything characteristic at all. They all looked alike, and still there are produced from this bud skin, nerves, muscle, bone, vessels, etc.

In order to explain this puzzle of origin and growth, Charles Darwin established a theory which he called a provisional hypothesis. He said in our bodies, all through our lives, small particles, so-called "gemmules," are detached from all tissues, which float in the body, and at last settle down and produce the two most important organs of generation,—the ovum in the female and the spermatozoids in the male. He himself called it a provisional hypothesis. If nothing else would prove what this great man was, those few words do. He felt it was an hypothesis, and honestly said so. Whenever I come to speak on this topic, I cannot forget my dear old friend, Louis Elsberg. He was the first to establish what he called the preservation of the plastidules, the latter word meaning only the molecules of living matter. Before I knew him personally, he had published this beautiful theory, which meant that every ovum and every spermatozoid will contain innumerable molecules of living matter, every one of which has the properties in it, not only of the father and mother, but of the whole ancestry, and which by environments, by education, are increasing in number. This means that we are improved by learning and by education, and everything that is in us, every particle, bodily and mental as well, is deposited within the ovum and the spermatozoids. A sixth finger of the father—to give you a rough idea—or a mole on the nose of the mother are bodily deposited in the ovum, and by the mixture of both may reappear in the progeny. This theory was contradicted by Haeckel, in a very good book entitled "Perigenesis," in which he rejects these views, and lays stress upon the influence of the environments mainly. I consider the theory of Elsberg's the best ever established, and all talk and all the waste of printing ink would be superfluous from the moment we become conscious of the fact that we are but the outcome of not alone our parents, but of our whole ancestry. The rest is, however, speculation. We do not understand why, as sometimes happens, if the father is good-natured the boy is not; and if the mother is ugly, the daughter, on the contrary, beautiful. I do not wish to injure anyone's religious ideas, but from the moment we admit that there is living matter, and nothing but matter, that everything is mentally and bodily deposited in the genital parts, we approach the understanding of generation.

What makes those elements multiply and grow? Not only that,—what makes them form what they do form? A gifted dentist, Dr. Williams, who is not now in the United States, once said that the odontoblasts will form nothing but dentine, and the osteoblasts nothing but bone. Why is this? In order to explain it I will just tell you that the whole process of growth becomes explicable by assuming millions of years of education on the materialistic foundation of Elsberg's theory. A professional atheist or agnostic I am not. I never shake anyone's faith; but I am personally convinced of a materialistic basis of transformism.

What we have heard from Professor Peirce is, as he himself said, nothing but history. There are far more important points which I hope will some day be worked out by him; and permit me to draw your attention, as well as his, to some points which are original with us in America.

Let us look at the distinction between ontogenesis, which means the formation of an individual; phyllogenesis, which means the three original layers of the germ, out of which the being is formed ; and organogenesis, the development of the organs as such.

Ontogenesis I wish to lay aside, but let us consider phyllogenesis and organogenesis, with special reference to the development of the teeth.

In a series of articles published by Dr. Bödecker and myself some four or five years ago in the *Independent Practitioner*, of Buffalo, in the chapter relating to the development of enamel Dr. Peirce will find some remarks which, perhaps, will be considered by him worthy of some thought on his part. There we say that the outer layer or the epiblast of the germ which forms epithelia gives rise to the enamel-peg and the future enamel-organ. The outer layer being in contact with the outer world, not only furnishes us with protection, but is the basis of all future tissues of the nervous system, and of everything that we call in the future sensual organs,—vision, hearing, etc. Is it not strange that the outermost layer, evidently the most insignificant, lays at the same time the foundation of the future nervous system,—brain and spinal cord,—and is the source of future eyes, ears, etc.? If we consider the fact that all that we call sensual perception is just the reflection of the outer world into our interior, and everything in the line of direct sensual observation is the work of the brain indirectly, we can readily understand that it is the outer layer which produces those organs called the brain, the spinal cord, etc.

It is a wonderful fact that what we call a tooth is the product of two different layers, the enamel being the outcome of the epiblast or epithelium, and the dentine of the mesoblast, connective tissue. The epithelium originally formed for the benefit of the future enamel does not remain epithelium ; it changes to myxomatous connective tissue, but the fact remains that enamel originally results from epithelium. How do you explain that?

At a certain stage of development the human embryo resembles fish ; there are gills, there is a little tail, the prolongation of the spinal column, and there is an age where you could not distinguish a human embryo from that of a dog or a pig. What, then, is the distinguishing feature? It is the brain, the nervous system. Everything we have learned is placed again in a certain shape, bodily, in our mental organs, and it is the cerebrum which enables us to do what we do, to build railroads and steamers and telegraphs and everything we boast of. The great cerebrum distinguishes us from animals. This is, therefore, the basis of everything we are proud of. At the same time it is a source of a great deal of mischief, the greatest being that we speculate ; that we do not trust our own senses, that we are continually in doubt whether we do exist, or not,—whether the world exists, or not.

Schopenhauer, one of the most prominent German philosophers, put down the view in plain words, and all his followers do, too, that nothing around us does really exist ; it merely exists in the way in which we look at it. Our "original sin" is not that we are born, but that we speculate. Take, for instance, the fish-eagle flying high up, scarcely perceptible to our eyes. It looks into a lake from a great distance, and sees a fish. Does it speculate whether it is a fish or not? No ; it darts down and catches the fish and eats it up. We, on the contrary, speculate whether there is such a reality as a fish or a bird, and our senses are neglected. Many animals observe better than we do.

I will, in conclusion, draw your attention to the fact that there is a wide field open for the history of the development of the teeth from an organo-genetic point of view. There are certain turtles, Chelonia, which have epithelial or horny ledges for mastication; such ledges exist also in the human embryo at the sixth week of development. Is there a Charles Darwin among you who is willing to study the history of development of a series of animals, and compare it with man? He would have to show how it is that the horny ledges of some turtles are growing into the depth in higher animals in order to produce enamel. That is the way to arrive at positive conclusions. Thus far we can speculate only. Who can do such work? Charles Darwin was not alone gifted with excellent senses, with an acute, sharp, observing brain, but he was also endowed with the fortunes of the world, and could afford to travel around the world for five years and gather large collections of animals upon which to make studies. If such a man should ever come forward, treasures are sure to be in store for him, and he will be to the dental profession what Darwin was to the world at large.

Dr. J. Smith Dodge, Jr. Mr. President, this sketch of the doctrine of Darwin shows that doctrine to be its own illustration. As Professor Heitzmann said, no great theory comes fully grown into the world, as it appears the theory of Darwin did not. It began in a rudimentary state, and little by little, through several generations, it grew to the proportions which it now holds,—a vast theory that aspires to account for all things, and will, perhaps, in the future be held to account for more things than any other theory which has ever been propounded about physical affairs. But the principal point on which I have something to say is the new name which the essay presents to us. For my part, as a dentist, I incline to the practical side of scientific things, and I should not venture to add anything to that very interesting and far-reaching survey of the Darwinian theory which Professor Heitzmann has given, if it were not that I propose to take the other aspect of it, to get at something which you can begin working upon to-morrow with the first patient that comes in, and keep at all the rest of your professional life.

It is proposed that instead of talking about evolution, we should talk about transformism. You may name your baby Ethel, rather than Jerusha, because it is a prettier name; that may be a reason, but it is not reason enough for changing a well-established scientific name, and the proposal to make the change necessarily signifies that those who adopt it have found in the old name something too much or too little of significance, and imagine that the new name corrects the defect. I have no doubt that they found too much significance in the word evolution, something which they desired to leave out, and which is not implied in the new word transformism. It is this something that you and I want to believe in and to work upon and work for, as we are manipulating the mouths of our patients, and I am a little anxious not to have it cast out of thought.

What does transformism mean? Of course the fundamental meaning, the root of significance, is in the word transform. Take the Darwinian hypothesis, and ask yourself how much of it can be fairly included in this name. I suppose those two conceptions, those two parts of the entire law which are the most often spoken of as constituting the whole of evolution, although they do not. The law, in the first place, that every successive generation of a species of living creatures produces a great number of varieties in the offspring, so that if there be any power of selection whatever, there will be furnished each time a large variety of slightly varying reproductions to select from,—that is the first point, and there the transformism applies well enough. The other thought is that the conditions into which each new generation is born have a power of promoting the vitality and the continuance of those varieties which are most favorable to their surroundings, and of ultimately repressing those varieties which are not favorable.

These two thoughts of a hereditary assurance of variety constantly presented, and of a power of the surrounding conditions to select the most favorable, may all be well implied in the word transformism, and I fancy that these two are often thought of as constituting the hypothesis of Darwin. Whether they did in Darwin's thought or not, they do not cover the facts of nature. There is another thing which is not accounted for when these two principles are brought together and set at work. To make this plain, let us suppose a case entirely possible under this hypothesis, but which you will at once see to be wholly out of accord with the facts of nature.

Suppose a species produces a new generation ; suppose there are a hundred varieties among the new generation, not one of them as good as the last. Then the surrounding conditions will act upon these hundred varieties, and those which are best adapted to the conditions will be conserved, but by the supposition none of them are as well adapted as the parents. Now, suppose this to continue generation after generation, and you will have a type that runs down and runs out, without any modification of the determining conditions. This might perfectly well occur if these two principles are all. I am not aware that it ever has occurred. When species have deteriorated, it is customary to attribute it to unfavorable surroundings so that the original type was too good for its surroundings, and therefore unfit to live in the altered conditions.

On the contrary, it is part of the well-known facts of nature, and it is that upon which the hypothesis of Darwin is built, that everywhere are found traces of species developing into better species. In the Peabody Museum at New Haven you may see that series of fossil remains which Professor Marsh discovered in the far West, which is, I believe, the most perfect demonstration of a series of advancing stages that justify the Darwinian doctrine. There is one creature, about as big as a small dog, with five claws on each foot, and step by step he grows in size ; his superfluous claws dwindle, his nails develop into hoofs, and he is the ancestor of the horse. It is an ascending series, and there is something in it which gives the upward tendency. There is something necessary, then, to be taken into the account which forbids that there should be a retrograde movement without retrograde conditions. There is something which guarantees that there will be found in each generation individuals enough to keep the species going, that are up to the highest mark as yet attained. And it is found everywhere that if the conditions ameliorate, if the climate grows milder, more sunshine or more rain, if food is more plentiful, if hostile species are reduced, it is found that the species goes above its old ancestors, always, I believe, without exception. This is the point that is practical for dentists. It is found that not only is there something which guarantees a succession of individuals that shall be up to the ancestral mark, but there is something which holds a possibility of going above that mark, if the opportunity is only afforded, and this may endure nobody knows how long.

Let me mention one of the most marvelous spectacles that the last generation has witnessed, which may be new to you. It is now about two generations since Japan was opened to modern civilization. Japan has a recorded history running back two thousand years, authentic and somewhat complete. We know what the Japanese have been doing; we know what have been the high-water marks of their literature and their thinking. There has been nothing in all these two thousand years occupying the Japanese brain (beyond the incidents necessary to daily life) of the nature of exact science or mathematical study. They had not had any such thing for two thousand years until the war vessels of Commodore Perry sailed into their ports and broke open their gates, and then came like a flood this stream of modern civilization, so largely consisting of accurate scientific study and largely based upon mathematics. What does the Japanese brain do under this flood? The first generation did not do much; the men who were pretty well grown when the new civilization came, admired it and consented to it; they established schools, and then their boys went into these schools or came to America or Europe to obtain this modern civilization, and behold! this Japanese brain, through all these many generations, has held the possibility of not only learning out of books, but thoroughly grasping and even carrying forward the exact science of our time, and excelling in mathematical science; until to-day there are produced by natives of Japan, in their own institutions, scientific studies, the reports of which are admitted to equal the best scientific literature of the world, and which take rank with the profoundest thought on these subjects of Europeans or Americans. There was something which held and transmitted the possibility. Doubtless these Japanese brains, during so many generations, produced individuals who were equal to the highest that their ancestors had achieved in the way of thought or study; but it is certain that they had none of these things of which I have spoken, and were not exercised in them; and yet when the environment and the conditions changed, this long-dormant possibility asserted itself.

That is what evolution means and transformism does not mean,—something to be developed. When next spring comes and the lilac buds begin to swell, pluck one and cut it open; you will find there layer within layer of embryonic leaves, tinted with pale green; in the center, if your bud is the right one, you will find what will be a cluster of lilac blossoms,—a cluster of little white globular bodies, smaller than the smallest pinhead. They have been waiting all winter in this bud. When the spring comes, with the proper external conditions, these enveloping leaves begin to roll themselves out, and the stalk begins to lengthen and push out the bunch of blossoms which is to crown the end of the new-grown twig, until you will have at last full branches and broad leaves and fragrant blossoms. It was all in the bud, and it has been rolled out,—that is, evolved. In the same way there is something wrapped up in the imperfect species which is struggling to bring itself into the world, just as fast as the conditions will permit.

It is that idea which those who would substitute transformism for evolution wish to drop out. You and I cannot afford to give it up.

Let me come to the practical part of it now. We see a great many defective mouths. We see a great many poor teeth. Is there any future for them? Is there anything besides what the dentist can do that can be counted upon in the bettering of these conditions? I might have to practice dentistry for a living, but I should not practice it with any heart if I did not believe there was.

I have practiced dentistry in this city for over thirty years,—right in the same class of people. I came into the practice of my father, so that I saw the endings of his work and I have seen the continuance of my own, and I know I have seen a great improvement in the teeth of this class of citizens in New York. The people who are now growing old do not need to have artificial teeth as early as their predecessors did. They keep their teeth better. The children who are brought to me now do not so commonly present desperate cases. There is not so much to be done, taking the class as a whole, and the whole aspect of the case has been lifted up. What has done it? Why, that general improvement in the knowledge of sanitary science, that vastly enlarged common sense in the minds of mothers and nurses, of which we are all aware, which so strongly makes for the bettering of children's health. I remember when little children used to go around in winter in white muslin dresses, with low necks and short sleeves, with thin stockings, and kid shoes that did not even cover their feet. You do not see that now. You see children warmly dressed, differently fed, and differently exercised. Within the last few years the nervous strain that used to be put upon them in the earlier part of their education is largely diminished, and in every respect their surroundings are greatly improved. The result is that something which is in these children responds, and with the rest of the child the teeth respond too. I wonder who started that idea in the papers that the process of evolution is eliminating the human teeth,—that the wisdom-teeth are almost gone, and that the laterals are going? It is not true. We see three cases of supernumerary incisors where we see one mouth that never had any laterals, and we see almost as many fourth molars as we see mouths that have not had third molars. Instead of deteriorating, all these modern processes which better the environment are responded to by something in the child which has always been there, and has only waited for these better conditions and better surroundings to assert itself.

Because this is to me, and I think it is to most of you, a fact, a serious and important fact; because it is that upon which we work and to which we look for the best results in the future; and because it is implied in the word evolution,—something wrapped up that will be unfolded as soon as the surroundings give it a chance,—and because it is stricken out, and is meant to be, by using transformism instead, —therefore I hope we shall not cease to call it evolution.

Dr. D. R. Stubblefield. I am sure this society joins me in congratulating Professor Peirce upon the worthy contribution with which we have been entertained. But while we willingly ascribe value and felicitation to the essay, in my opinion we should give even greater value and higher encomium to the animus that evolved it. Professor Peirce has taken the high ground that this representative body of our profession has not only the right but the actual obligation resting upon it to go out into the broader fields of general scientific thought and investigation. He claims, and I fear we must agree with him, that we have slothfully rested our claim to be a "liberal profession" too long upon the mere assumption. It is high time we were manifesting more than a disposition to claim the empty title of liberal scientists and to render that title full and true by engaging in scientific research, even though it is not visibly connected with dentistry pure and simple.

I am free to confess that while I claim an average familiarity with the writings and teaching of Darwin and the rest, I have not been able to give the assiduous attention to the details that would warrant me in presuming to critically present a *résumé* of belief or unbelief.

Having made this expression of my inability to deal in anything short of generalities upon the subject, I trust I may have your indulgence while I present very briefly my personal opinions. From a more or less extended study of biology and physiology, I am prepared to accept as highly probable very many of the deductions made regarding the variableness and often approaching tendencies of species in both vegetable and animal organisms. I am prepared to believe that disuse, when persisted in, is accepted by nature as conclusive reason for impairment and even removal of any organ, without the limited range of a necessary few. In the world of physiological surgery no fact is more frequently illustrated and combated. And in the extension of this admission I am willing to concede that as the time or duration and opportunity are increased, the structural changes and modifications would of necessity render themselves more pronounced. Function for a long time held in abeyance would quite naturally be met by a growing change of form. This I believe and am willing to attempt to prove.

Again, I am willing to accept as true that many species and forms, even considered minutely, are not only parallel but quite similar in fashion and function. I am willing to believe that life exhibits itself in a chain, so to speak, more or less recognizable, from the lowest up to the high organism in which it appears.

I believe that this might be expected without any great stretch of imagination or credulity, in view of the fact that congeniality and association without friction would concur with our ideas of a sensible Creator, manifesting His might in an adjusted and correlated creation. Following this out, I am perfectly willing to believe that as the order of created animal life approaches man, the capstone of all, similarities in structure would naturally present themselves. And as structure modifies function, we may not be surprised to behold startling suggestions arise and equally astounding speculations spring up. Indeed, I am willing to go right up to the very brink of the admission that man differs only from all others in the chain of being by his position in that chain, but I am not able to go any farther.

At this point I may have to yield all the ground I have gained up to this, by the failure to accept what gentlemen may be pleased to call the logical sequence. I am willing to confess that I cannot give a reason for the faith that is in me. But I cannot, and I confess I have never seen justifiable grounds submitted which enable me to give up my belief in my unbelief, that a man and a monkey are children of the same parents. "If that be treason, make the most of it." I confess that I am unable to reconcile my belief in the immortality of man with the recognized mortality of all the lower orders. Either we must admit that life, however feeble, in vegetable or animal existence is identical and just as highly to be respected in that manifestation as in man, differing only in degree, or we must hold that somewhere along the line there has been injected into man the immortal part. I do not believe that any concessions of similarity of parts physical extend themselves necessarily into the spiritual. I cannot prove it. Neither can I prove my own sanity, but I believe without limit or reservation in both.

In conclusion, I believe that creation does not necessarily inhibit the facts of evolution. And I believe that the existence of all material forms through which we behold the phenomena called life is a struggle for supremacy over the contraindications of its environment. I believe in the survival of the fittest, and I for one am actuated by a very keen desire to fit myself for survival. Every doctor who sees the battle of life entered by the weaklings of a diverse procreation and heritage cannot but believe in the survival of those best fitted to grapple with the myriad adversities that actually throng the threshold of life. I believe that a Creator who would so admirably and wisely adjust all created living things to the essentials of existence would not waste immortality, so to speak, in the countless hosts of subsidiary creations which must die in the struggle for the survival. I believe the air and the sunshine are the best possible benefactions of a Creator who intended kindly toward His creatures. Although I am not able to explain life, nor the mystery called death, and must confess my inability to tell the reasons why we ever were created, I do believe in "God the Father Almighty, Maker of Heaven and Earth," and rest my case on that.

(To be continued.)

SOUTHERN DENTAL ASSOCIATION.

(Continued from page 73.)

SECOND DAY—*Evening Session* (Continued).

DR. D. R. STUBBLEFIELD, Nashville, Tenn., fancied that to discuss a paper like this without reiteration would be impossible. The facts stated, so far as we know, are incontrovertible; the paper is a *résumé* of what is known of pus-formation. Especially is the case cited of the diagnosis of the Paris physician worthy of attention, as it goes to prove the value, if proof were needed, of microscopy in diagnosis. The paper has excellently discussed pus and its nature, and the association is to be congratulated upon the clear statement of the movements of the white blood-corpuscles.

Dr. W. C. Wardlaw, Augusta, Ga., regretted his lack of words to sufficiently express his admiration of this paper. It is valuable to him in that it enables him to see what before caused much trouble to understand. The writer made a logical demonstration of the subject, and very little can be added as to the origin of pus. The writer might have gone further and told us why these molecules began their wanderings. They do wander around among the tissues, but why do we not have the untoward result more frequently? Why is it that where we might expect virulent sequences we often have none, as when traumatic lesions heal up without pus?

Dr. J. Y. Crawford, Nashville, Tenn., wished to offer his approbation of the paper in a general way and to thank its author. With reference to one idea brought out in the paper and also manifested in the remarks of Dr. Wardlaw, the ultimate process of pus-formation, reading and observation lead to this statement: That the derangement of the function of the white blood-corpuscle when it first takes up foreign material is not complete except when there is a general or localized hyperemic condition of the blood, in which the proper process of metabolism is dethroned. Then proliferation takes place, which act impairs the functional activity of the white blood-corpuscle to perform the specific work of bestowing in each portion of the system the material out of which bone, skin, and muscle are built. The blood in this hyperemic condition, whether general or localized, virtually puts the white corpuscles in a state of receptivity, so that they are impressed by various specific influences that produce specific diseases. So that the process described in the paper does not at all antagonize the modern idea of the importance the germ plays in the production of disease. We have come to the full recognition of the fact that a local hyperemic condition of the blood in which we find the white corpuscles predominating causes a want of functional activity of the blood. In the normal condition the white corpuscles of the blood have been beautifully styled the "feeders of the body"; they have also been denominated the "scavengers of the body" in diseased conditions, and they may be the means by which effete and objectionable matters are thrown off. The idea he wished to impress was that general and local anemia is one and the same thing, in which the white blood-corpuscles predominate to such an extent that their functional activity is impaired, and that we have in localized anemia the formation of pus by the aggregation of diseased white blood-corpuscles.

Adjourned till to-morrow morning at 9 o'clock.

THIRD DAY—*Morning Session.*

The association was called to order pursuant to adjournment, President Wright in the chair.

Dr. Henry E. Beach, Clarksville, Tenn., wished to refer to other causes of decay of the teeth than that so strongly spoken of in the paper by Dr. Gingrich, namely, syphilis. It is a matter of experience that in persons of all ages the teeth are very seriously affected and caries is often introduced and progresses very rapidly under the influence of such diseases as typhoid fever, smallpox, and malaria, while among our female patrons a seriously detrimental influence is exercised during the periods of gestation and lactation. There is hardly a dentist present who has not noticed a line, usually across the edges of the incisors and across the cuspids, and on inquiry it is learned that at a certain age the child had measles or something of that kind, causing an interruption of the formation of tooth-substance. There is another influence, one which dentists talk too little about and consequently the world thinks too little about, and that is cleanliness. Many times teeth are lost unnecessarily for want of cleanliness. Ladies and gentlemen should all keep their teeth clean, but above every class on earth, ladies should do so. Many a beautiful face is marred upon the mouth being opened, and its owner shamed by the teeth advertising her uncleanliness.

Dr. T. M. Milam, Washington, Ark. In Arkansas we have a disease which is called "slow fever," and the doctors mostly treat it with muriated tincture of iron. When one of his lady patients gets a spell of that fever he expects her teeth to be decidedly the worse for it, and the teeth do come out of it, as far as condition is concerned, like a buggy that has been run away with twice. He has gone to the physicians and told them they were ruining the teeth of their patients; couldn't they get something else to give them besides muriated tincture of iron? And the reply was that they had to give it; that it was better for their patients to lose their teeth than their lives. It may be the fever and not the medicine that injures the teeth; but there is one physician there who has been treating his patients without acids,—with liquor,—and he would say that the teeth of patients so treated were not so bad. He did not know whether this fever prevailed anywhere else, but there it lasted six, eight, fourteen, and even twenty-two weeks, and when the patients got well they had no teeth. As to cleanliness, he knew that his patients kept their teeth clean, but if anyone present could tell him anything about slow fever and the muriatic acid which was ruining the teeth of his patients he would like to hear it. He wanted to be able to tell his patients why it was that when they had slow fever their teeth were lost.

Dr. Beach. Brushing the teeth with a tooth-brush and picking them with a toothpick doesn't always keep them clean. Some of the most beautiful sets of teeth are those which have had the least care. If you will take a piece of silk thread, draw it between teeth that are not taken care of, and put what comes out under the microscope, you will see thousands of little microbes kicking about.

Dr. Crawford was somewhat surprised at the drift of the argument last night on the paper of the gentleman from Virginia, leading, as it did, to the conclusion that the old ghost of heredity still lifted its objectionable head. While hereditary taint was a question to consider, he believed it was made a scapegoat,—a loophole through which many mistakes of the medical world had slipped. In the matter of life insurance, many a man's family is to-day exposed to want as a result of the misconception of this question of hereditary taint. One of the most successful insurance companies, I am informed, ignores the idea of the influence of hereditary taint on the direct production of disease. Dental caries is not inherited; it is very doubtful if any individual ever inherited phthisis pulmonalis, and he would prophesy that one of these days the apparently remarkably hereditary tendency of this disease will be questioned by the entire scientific world. Some peculiar tendency may be inherited, but that the parent will transmit to the child the specific germ known as the tubercular germ is universally doubted by the best critical minds in medicine. Not dental caries, but the susceptibility to it is inherited, and dental caries as a specific disease localized has not yet been settled from an ethnological standpoint. He did not accept the conclusions of Dr. Miller as definitely settling the question. Dr. Miller claims to have produced destruction of tooth-substance out of the mouth which was identical at every step with the process which goes on when the teeth are in the mouth. With all deference to the ability of the gentleman, he begged to assert his opinion that the processes were not the same; that the process by which a tooth is destroyed after its pulp has been lost is not that disease which is recognized as dental caries. Certainly a tooth which has been extracted has lost its pulp, and all vital connection with the organism. The change which goes on with the tooth *in situ* with a living pulp is probably a chemico-vital process, but certainly this cannot be claimed of the process which is produced by chemical reagents in a tooth which has been extracted.

There is another point upon which he wishes to express his dissent from the authorities, and that is with reference to the development of the teeth. He does not believe that when a tooth has erupted through the gum it is as large as it ever will be, because he is sure that is not true. Teeth do grow as long as they are under that wonderful influence which is called vital power. They grow in less extent and smaller ratio after they are erupted than before, but they do grow, and any disease which retards that growth will make the teeth more susceptible to dental caries. How do the little notches and grooves on the teeth disappear? They are said to wear out, but if this wear were to continue at the same rate the entire tooth would be worn out before the man was forty years of age. These notches and grooves grow out, and just as the teeth of the squirrel continue to grow, so do the teeth of the child. The only difference between what occurs in the process of healing a case of fracture of a tooth and the process of growth is that the conditions are more favorable to the latter, but when these favor reunion in a fractured tooth there is repair. He should hope for success in promoting union in the case of a simple fracture of a tooth in a patient of, say twenty-one years of age, if the parts could be kept perfectly still. If a tooth unites in one instance, it is proof that it could, under proper circumstances, unite again.

Dr. Henry W. Morgan, Nashville, Tenn., understood Dr. Crawford to make the statement that it was impossible for a devitalized tooth to decay. If this was true, how was it possible for Dr. Miller to produce dental caries artificially, as he certainly does, so perfectly that it is impossible for the best microscopists to distinguish the difference between the caries which occurs in the mouth and that which he produces?

Dr. Crawford stated that he did not admit this observation of Dr. Miller's as being absolutely correct; and he wished to plead guilty to the charge of denying that the destruction of the teeth after devitalization was analogous to what it was before.

Dr. Wardlaw had at first thought that Dr. Crawford was questioning some well-settled propositions about heredity, but when his meaning was explained, the speaker was ready to accept his position and to agree with him. We inherit the susceptibility or perhaps the predisposition to certain diseases, which under peculiar circumstances may develop, though many persons with these susceptibilities go through life without trouble. So the chemico-vital theory of which he speaks is evidently not the chemico-vital theory which was put forward some years ago, and which has since been sufficiently exploded.

Dr. Beach does not believe that the teeth continue to grow and occupy more space. The teeth do grow after they have been developed in the mouth, but they do not grow externally. When the crown of a tooth has become fully erupted it has more substance than at any other time, is larger than it ever is afterward, externally, an evidence of which is that peculiar notched condition of the newly-erupted incisors. Instead of growing larger, the teeth grow less ; they wear out. That is the point, and if given five years, he thought he could demonstrate the fact.

Dr. W. T. Poole, Columbus, Ga., thought that physicians should know something about the injury liable to be done to the teeth by the giving of certain medicines, much of which could be avoided by at once washing the mouth or by taking such medicines through a quill. There is no doubt that when one part of the body suffers from disease, the whole suffers. After a severe fever the effect on the teeth may not be noticeable at once, but after six or twelve months the injury will be seen. Their vitality is weakened by the disease the same as any other portion of the body.

Dr. B. Holly Smith, Baltimore, thought we ought to keep hand in hand with the medical men, and not do them injustice. The large majority of them have a kindly regard for the human system, and very few would give medicines which would have a deleterious effect on the teeth without trying to protect them. We are working in the wrong direction when we question the correctness of men like Dr. Miller, whose position as scientific investigators is assured, especially in matters which have been illustrated and proved beyond doubt. Dr. Crawford did not sufficiently meet the point advanced by Dr. Morgan with reference to the changes which take place in vitalized and devitalized teeth. As to Dr. Crawford's theory concerning the growth of the teeth after the spark of life has begun to decline, the speaker, for one, could not believe it. However, it does not make much difference to us as dentists whether this theory is true or not.

Dr. Wardlaw agreed with Dr. Smith, that it made little difference whether the teeth continue to grow or not. It is well known that the teeth of rodents continue to grow, and that is because their condition of life requires it. Why may not the same occur, in smaller degree, in human teeth? It seemed to him that it could.

Dr. J. S. Thompson, Atlanta, had had occasion, just before leaving home for this meeting, to cut down a gold filling which protruded beyond the enamel of the tooth in which the filling was situated. Some change was evidently going on there, but whether in the enamel or the gold he could not tell. There was no apparent wear of the enamel, but on passing an instrument over the surface he was satisfied that it could not have been left so. The gold had certainly protruded beyond the enamel. Had any gentleman ever observed a similar case?

Dr. A. P. Johnstone has in mind a case where a filling was inserted midway between the cutting-edge and the gum-margin of a tooth, and the gentleman in whose mouth it is, is under the impression that that filling is constantly getting toward the end of the tooth. Whatever the change is, it has been going on for fifteen years, and the filling is now nearly to the point of the cutting-edge. Like causes will produce like results when acting under similar circumstances. If we can get at the cause of a given result, we have some right to hope to again produce that result; so that if the teeth do grow, it is a fact of the utmost importance to us.

The subject was passed.

Dr. E. P. Beadles, Danville, Va., then read a paper entitled "The Bacteria of the Human Mouth," illustrating the different forms of bacteria described, and the changes they undergo under certain conditions, by means of colored diagrams. An abstract follows:

Adverting to the greatness of the field of the microscope, the writer expressed his belief that no professional man could afford not to, in some degree, acquaint himself with the investigations of others along these lines, though the calls of every-day life should prevent him from making investigations for himself. Indeed, he considered it inexcusable for a man to be treating diseases day after day and not be, to a certain extent at least, informed as to the latest theories as well as facts regarding disease. Hence, if anyone present had not had the opportunity to glance over Professor Miller's "Micro-Organisms of the Human Mouth," he asked his attention to a condensation of some of the ideas and investigations of that author. Regarding the origin of bacteria, it has been settled beyond question that the proposition *omnis cellula e cellula* is as applicable to these as to the higher animal organisms. Three groups of bacteria are recognized, namely: the aërobic, those to which oxygen is absolutely necessary; the anaërobic, those which thrive better without oxygen, or even demand the exclusion of air for their development; and those which flourish with or without oxygen. The first group is the largest, and very few of the second group are known. Acids and alkalies, especially in very dilute solutions, retard the development of most forms, though to this rule there are notable exceptions, as the acetic acid bacterium, which grows best in an excess of one to two per cent. of acetic acid, while micrococci will bear a high degree of alkalinity; but a neutral medium is best adapted for the development of most kinds. Light, heat, and electricity have very little or no influence upon their development. It is therefore a fiction to assert that combined fillings of two metals, as gold and tin, prevent the growth of bacteria by electrical action. If a number of different kinds of bacteria are brought into a common culture-medium, one of them will always attain the supremacy, and by the injection of nutrient media into the culture, continued through several generations, it may occur that only one form will remain, the others having been crowded out.

Bacteria are distinguished, according to their action upon living bodies, as pathogenic and non-pathogenic, the former signifying those which when brought into contact with any part of a living organism under favorable conditions multiply and give rise to either local or general disturbances; the latter those which under similar circumstances disappear without having wrought any apparent damage.

Passing to a consideration of the causes which have been assigned for the production of caries, the paper stated that Professor Miller clearly disproves the inflammation theory, which is held by many at this day, because it is not possible to produce decay of the teeth or anything resembling it by any of the agents which invariably set up inflammation in other tissues. Pulpless teeth, and dead teeth worn on plates or as pivots, are subject to decay in the same degree as teeth with living pulps. And, again, it is possible to produce decay artificially, which under the microscope is indistinguishable from that which goes on in the mouth. The putrefaction theory seems to receive its quietus from the statement that an extracted tooth left in a putrefying mixture for any length of time will not show a trace of decomposition.

Professor Miller holds to the chemico-parasitic theory, *i.e.*, that chemical action takes place first in the tooth-structure, closely followed, in all cases, by micro-organisms. The mode of action of bacteria upon the teeth is not by boring holes in them, for they have no boring apparatus; they are nourished entirely by substances in a state of solution; so that, if a solid substance is presented to them, they must liquefy it before they can make use of it, and upon this power of liquefaction depends the destruction of softened dentine, the second stage of decay.

It seems remarkable that so little attention has been given to the subject of antiseptic materials for filling teeth. One method of determining the antiseptic action of filling-materials is to inject a tube of ordinary nutritive gelatine with a bacterium from the oral cavity, melt the gelatine and shake it slightly so as to distribute the fungi equally, and pour upon a horizontal sterilized glass plate, upon which are then dropped pieces of filling-material. If the filling-material is not antiseptic the plate will become clouded and opaque in twenty-four hours, through the development of innumerable colonies of bacteria; while the retarding or prevention of development of the fungi in the neighborhood of the filling-material will measure its antiseptic power.

Most of the filling-materials in use have been tested. Gold amalgam, freshly mixed, has a slight retarding effect; old pieces, none. Oxychloride of zinc, fresh, has a marked effect; twenty-four hours old, none. Oxyphosphate, very slight effect. Gutta-percha and tin, completely inactive. The results from gold are peculiar and perplexing. Some of the preparations manifest a decided retarding effect upon the development of bacteria; the antiseptic effect of Pack's pellets is particularly marked. But the antiseptic quality of gold is completely destroyed by annealing. The antiseptic power of some non-cohesive foils perhaps explains why badly inserted fillings sometimes preserve the teeth well.

The paper then related experiments by Miller with teeth filled with various materials and placed in a mixture of saliva and bread at a temperature of 30° to 40° C. for three days, then washed, dropped for a moment into sublimate 1–100, again washed and dried, with the following results:

1. Copper amalgam; in fifteen teeth treated as described, not a single case of development of bacteria.
2. Gold amalgam; ten teeth. In every case development of bacteria around the dentine.
3. Oxyphosphate; eight teeth. Development in every case.
4. Oxychloride of zinc; eight teeth. One case remained sterile; in seven growth retarded to some extent.

5. Iodoform powder; one tooth. Development unchecked.

6. Powdered sulphate of copper incorporated with cement or gutta-percha, or simply strewn upon the bottom of the cavity before inserting the filling; nine teeth. No trace of bacteria in any case.

Miller very justly concludes from these experiments that copper amalgam fillings have a marked anti-bacterial influence upon the walls of cavities containing them. Professor Miller's experiments lead him to condemn implantation and even transplantation, with which conclusion the writer agreed. The writer concluded with a recommendation of the book from which the material for his paper was drawn.

The subject of Histology and Microscopy was called, and Dr. Wardlaw, chairman of the committee, read a paper, of which the following gives the substance:

The desire of the writer in preparing this paper was to express his gratification that to dentistry is due so much of the recent progress in microscopy and bacteriology. What Koch has achieved for general medicine, Miller has duplicated for his specialty. The labors of Black, Abbott, Bödecker, Barrett, Miller, and other microscopists are rapidly pushing dentistry forward in the direction of an exact science. Long before the proof afforded by the microscope of actual existence of bacteria, there was an obscure, ill-defined idea among medical men that there was an intimate relation between *some* diseases and animalcula or parasites. Such an idea led to Jenner's discovery of the vaccine virus. Even after not merely the existence of bacteria, but the astounding fact that they were almost ubiquitous and in countless numbers had been demonstrated by the microscope, the method of their generation was unsettled, whether spontaneous or by direct descent, until Koch, by indomitable perseverance, demonstrated the feasibility of securing absolute freedom from liability to infection through thorough sterilization of hands, instruments, apparatus, and matter experimented on. And it is to his system of sterilization and his exact methods of investigation that the world owes the discovery of the bacillus tuberculi, the cholera microbe, the diphtheritic germ, the smallpox virus, and the spores of many other diseases, and in consequence the splendid possibilities opened up to the scientist for successfully combating the ills inflicted upon humanity.

The association of bacteria with disease followed soon upon their discovery, and many disease-germs have been isolated, studied, and classified. It has been determined by practical experiment that bacteria are responsible for at least a majority of the diseases incident to animal life. They abound in the mouth in untold numbers and great variety of species. The human mouth, with the decomposing food *dêbris*, calcareous deposits, vitiated secretions, decaying teeth, diseased gums, etc., is a perfect hot-bed for their propagation. Thence they gain entrance into the general system, being inhaled into the lungs, and swallowed into the stomach. They also manifest themselves locally in caries, pyorrhea alveolaris, and other dental lesions. Of the great number of species of bacteria, dentists are interested specially with comparatively few. In pyorrhea alveolaris they doubtless play an important part, though as yet but little success has been attained in the discovery of its specific germ, and consequently the antidote or germicide is not known.

As to the part bacteria play in dental caries, many investigators have contributed toward the development of the "bug" theory, as it is somewhat facetiously termed, the now generally adopted explanation, although some few microscopists still hesitate to accept it. To Miller, of Berlin, belongs the credit of defining its limits and demonstrating its truthfulness. His theory is succinctly this : Bacteria of a particular kind—the bacillus leptothrix—in some accidental way obtain a lodgment against a roughened spot of a tooth, or in some depression or fissure, or in some interspace, where fermentation may take place. In this nidus they rapidly increase, feeding upon any organic matter in reach—one another even—and excreting acids,—lactic principally. This acid, abundantly excreted by the Leptothrix buccalis, promptly attacks, chemically of course, the lime-salts of the enamel and dissolves them away. The bacilli are not small enough to penetrate the minute spaces between the enamel-prisms, but the rods are gradually decalcified by the acid, and finally the enamel is penetrated, when a more aggressive warfare begins. The micrococci crowd through the breach and spread out right and left through the interglobular spaces, dissolving the inorganic and consuming the animal matter and thus undermining the enamel crust. The dentinal tubuli reached, the voracious hordes press forward, penetrating as far and as thickly as possible, expanding the tubules, devouring the animal tissue, excreting lactic acid, and breaking down the walls of the tubules, the destructive process supporting itself as it advances.

The arguments on which this theory is based are, that caries is always accompanied by an acid reaction ; fermentation is caused by living micro-organisms, and bacteria are shown by the microscope to be present in every case of caries ; the excretion of the bacillus leptothrix is lactic acid, which will decalcify the tooth-tissue ; fragments of enamel and dentine will remain undissolved indefinitely in a sterilized solution ; artificial caries, undistinguishable from the natural by the microscope, can be produced by inoculation through bacterial cultures, and caries cannot be simulated by any chemical process, if micrococci are excluded.

Such an argument, based upon practical experiments, would seem to carry conviction. Admitting, therefore, that bacteria are the destructive factor in dental caries, how to meet and combat them is what next concerns us. For this purpose we have a long list of antiseptics, some of which are disinfectants, some germicides ; so that, while the bacterial influence is localized, a proper system of medication will prevent its further propagation. Unfortunately, some of the agents have to be used with great caution because of their poisonous properties. Because the environment of the mouth is so favorable to repeated infection its complete disinfection can be only transient, a fact which limits our efforts at local disinfection. This great discovery has, however, given certain control of exposed pulps, carious cavities, local inflammations, and other oral lesions, by the use of the agent suited to the condition.

Dr. Crawford wished to express his appreciation of the extraordinary care and accuracy with which Dr. Miller has carried on his investigations. He must be a wonderful man to attract the attention and high commendation of the world without advancing original ideas,—

that is, ideas which have not been agitated by some one before him. Take the combative influence of copper upon germs, upon which subject a paper by Dr. Miller was read at the meeting in Atlanta last year, in which was stated the advantage of using copper and tin. The idea was not new, and the proposition was weakened, in the speaker's estimation, by the classing of a form of amalgam as a therapeutic agent. Again, Dr. Beach was ahead of him fifteen years in suggesting the combination of tin and gold. One point bearing somewhat upon the idea of therapeutic filling-material was the idea of old Dr. Russel, who believed, as long as he lived, that gold was the best therapeutic agent. Dr. Russel could not explain why it was, but he practiced dentistry with that thought in his mind all the time, that in treating dental caries by filling the cavity with gold he was applying the best germ-destroyer.

Dr. Johnstone thought Dr. Crawford rather heavy on Dr. Miller. Dr. Crawford won't use copper amalgam, and he don't know whether it is good or not. Dr. Miller has put into writing much that others may have been practicing, but which had never before been in print. A dozen men may be working independently upon the same idea, but the man who puts it before the people is the one who properly gets credit for it. Dr. Miller is not infallible, but the speaker would rather have been able to put before the world the ideas which Miller has laid before them than have filled all the teeth he has filled in the past fifteen years. Dr. Miller says bacteria will grow in iodoform, and from the smell of it one should be prepared to believe that. Medicine does not, as a rule, accomplish as much, in dentistry at least, as a surgical operation ; but medicine will help the surgical operation along considerably, and he was obliged to say that iodoform has been of considerable assistance to him, so that until we have something better, he expects to continue the use of iodoform. A saturated solution of camphor disguises the smell of iodoform, but it should be used at once when mixed to get the best results. As to the antiseptic properties of copper amalgam, he confessed that he knew nothing. He did not believe that copper saved teeth, but Dr. Miller says it does, and he was willing to accept the theory until he could dispute it. He had filled teeth with gutta-percha and amalgam for years, and teeth in which he put copper amalgam three years ago were still preserved. He did not wish to be put upon the record as placing copper amalgam ahead of any other filling-material, but in the cases referred to the result was as stated. Dr. Miller says, "Under gutta-percha fillings bacteria grow," and in these cases the copper amalgam was the only thing to preserve the teeth.

Dr. Milam has been using Weston's amalgam for twenty-five years, and the fillings are still there and the teeth in a perfect state of preservation. He uses soft gold,—all the forms of gold,—sometimes making failures, but also successes with all of them ; but when he puts in a gold filling which does not save the tooth, he attributes the failure to Dr. Milam.

Dr. M. C. Marshall, Little Rock, Ark., did not understand that Dr. Miller had ever claimed to have originated the filling of teeth with tin and gold. What he did was simply to demonstrate and give wider currency to that system.

Dr. B. H. Catching, Atlanta, recognized the fact that Dr. Miller was the discoverer or demonstrator of the cause of caries, but that he did not claim originality for the method of filling with tin and gold he had described. Dr. Miller's father-in-law, the late Dr. F. P. Abbot, of Berlin, is generally understood to have been the father of that process.

The subject was passed, and the Committee on Chemistry was called, and Dr. Johnstone, its chairman, stated that there were no papers from his committee.

(To be continued.)

ANNUAL CONVENTION OF THE FIFTH, SIXTH, SEVENTH, AND EIGHTH DISTRICT DENTAL SOCIETIES OF THE STATE OF NEW YORK.

(Concluded from page 147.)

SECOND DAY (*Continued*).

DR. R. H. HOFHEINZ read a paper upon the subject, "Immediate Root-Filling."*

Dr. French said he was glad to verify the practice and theory of Dr. Hofheinz. We all get finally to the conclusion that what will save time in our practice is to our advantage. As the essayist says, the root-canal should be enlarged as much as possible, success depending as much on this as on any other point in the treatment.

Dr. F. W. Low said that he preferred the concentrated tincture of iodine alone to the tincture of aconite and iodine, as a dressing. He referred favorably to what was sold as Churchill's iodine.

Dr. C. S. Beck said he used bichloride of mercury in the proportion of one grain to the ounce.

Dr. Low said Dr. Miller uses it in the same strength.

Discussion closed, and the convention adjourned to meet at a banquet at 8 o'clock.

THIRD DAY.

The convention was called to order at 10 o'clock A.M., President Low in the chair.

Dr. I. C. Curtis, of Fulton, N. Y., read a paper on "The Relative Values (as Applied to Dentistry) of Non-Cohesive and Cohesive Gold, and a Combination of the Two."†

Dr. J. C. Gifford, opening the discussion, said he approved of the method described by the paper, but that in cases of cavities between bicuspids and molars he thought that the inference one would take from the paper was that only in few cases would the operator open up such a cavity through the grinding-face of the tooth. In his opinion but few cases of this class can be properly filled without opening up so as to enable the operator to do direct work. It is very difficult to fill a cavity beneath the grinding-surface, and it is preferable to open up every cavity so the work could be seen properly. In regard to retaining-points, they are sometimes drilled in at a slight angle to the cavity. This is bad practice, as it leaves the margin weak and liable to break down. Failures in approximal fillings are usually at either end of the filling, and they are frequently due to the anchorage under the enamel. There is no necessity for deep anchorage, as the filling is very unlikely to be displaced if it is inserted properly. The danger is from future decay in some neglected or weak place in the margin.

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* See page 182, current number.

† See page 201, current number.

Dr. H. A. Birdsall said the method described in the paper was one which he at one time used exclusively and still uses largely. The one thing necessary is plenty of room to work in. This is difficult to get without the tedious and painful process of wedging. He now uses soft gold and a matrix, with little or no separating.

Dr. G. Lenox Curtis said he had many failures where he had not direct access to the cavities. He thought it necessary to cut into the masticating surface or to cut into the side of the tooth. In cases where the decay did not extend to near the masticating surface the latter plan was to be preferred, but unless there was a good, strong support for the masticating surface it is better to cut it away and restore it with gold.

Dr. F. E. Howard said that he did not approve cutting into the side of the tooth, but would make the cavity a compound crown and approximal surface cavity, because when the side of the tooth was cut into and the crown left we would have to anticipate failure, and then we would have to cut away the crown and restore the whole corner,—a difficult and tedious operation. He thought Dr. Curtis's method of using cylinders good, but preferred to use Watts's crystals and the prepared pellets.

Dr. F. W. Low said he had had a tooth filled through the buccal wall, and in about six months the enamel wall broke down, and he had never since favored that style of filling.

Dr. Palmer said his practice antedated the use of cohesive gold, and he still used soft gold in preference. He thought there was much difference in the different golds as prepared for the market, and preferred Ney's foil to anything else. The surface has the best consistency for the work. He related the case of one of his patients thirty years ago, who had a large filling in the inferior second molar extending below the gum,—a very expensive filling, but it was leaking badly and had to be removed. He refilled the cavity with cylinders entirely, without any attempt to keep the work dry, as it was before the day of rubber-dam ; and the work was entirely successful. This could not have been done with cohesive gold, but can with soft gold. Soft gold he thinks the best filling-material yet discovered, because it works so well. Every blow will force it to spread so as to fill the cavity more closely and cling more tightly to the walls, while every blow given cohesive gold, which is harder than that which preceded it, will cause it to ball or roll up and leave the walls of the cavities.

Dr. C. S. Beck said he perfectly agreed with the ideas expressed in the paper, but did not agree that there was only one good operator out of every thousand. Failures are not so often due to the operators as they are to the pathological conditions in the mouth. No profession and no art is perfect, and of course the practice of dentistry is not perfect. Many failures are due to the carelessness of patients in neglecting to keep their mouths clean and in good order. Another reason why gold fillings fail is, because, while those who prepare gold for dentists are very careful to preserve all its good qualities, the dentist himself is not always careful as he should be to keep his gold from the air and defilement of any kind.

He preferred to cut away the grinding-surface of the tooth to make room to work, rather than to cut away the buccal surface, as had been recommended. He did this not only because he thought the grinding-surface would be apt to decay or break down, but also because he wished the filling to show as little as possible. He also would carry the cavity up under the edge of the gum at the cervical margin. We must not trifle with the qualities of gold, and must be careful not to destroy the characteristics which make it valuable. If the piece of gold inserted is bigger than the cavity, the destruction of its fibers in forcing it in will lessen the usefulness of the plug ; and if a filling is packed in with a sharp point the gold will be hashed up and the surface will be permeable, because the nature of the gold is altered by the manner of its packing. In all cases contouring must be done with cohesive gold.

Dr. I. C. Curtis, closing the discussion, said in cases of small cavities in the mesial surfaces of teeth, when they were well up toward the necks, it was better to use disks and polish down, leaving self-cleaning spaces, rather than to cut away so much material as would be necessary to fill the cavities.

Discussion closed.

Dr. G. Lenox Curtis read a paper entitled, "Where Dentistry Looks Over into Oral Surgery."*

After the reading of Dr. Curtis's paper, the president announced that the convention had received an invitation from the Sixth District Society to meet with them next year, at Binghamton. On motion, the invitation was accepted, and the convention adjourned.

CENTRAL DENTAL ASSOCIATION OF NORTHERN NEW JERSEY.

At the meeting of the Central Dental Association of Northern New Jersey, held February 15, 1892, the following officers were elected : Dr. Harvey Iredell, New Brunswick, president ; Dr. R. M. Sanger, East Orange, vice-president ; Dr. W. L. Fish, Newark, secretary ; Dr. C. A. Meeker, Newark, treasurer. Executive Committee, Drs. S. C. G. Watkins, Montclair, chairman ; Geo. E. Adams, South Orange ; F. C. Barlow, Jersey City ; B. F. Luckey, Paterson ; Oscar Adelberg, Elizabeth.

S. S. Hawley, *Secretary.*

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DENTAL SOCIETY ANNOUNCEMENTS.

DENTAL MASS MEETING.

The dental profession of the New England States, Pennsylvania, New Jersey, and New York will hold a grand mass meeting on the fifth Tuesday in March, the 29th inst. (an evening on which no dental meetings occur), in the Masonic Hall, Twenty-third street and Sixth avenue, New York City, at eight o'clock, on which occasion Dr. J. N. Crouse, of Chicago, Ill., president of the Dental Protective Association of the United States, and other speakers, will practically demonstrate why every dentist in the United States should become a member of the Protective Association. A circular letter and personal invitation will be sent to every dentist in the above states, and it is expected that all who can, will attend this meeting, remembering "*In union there is strength.*"

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*See page 187, current number.

W. W. WALKER, *Chairman Committee of Arrangements*,
67 W. Ninth street, New York City.

JOINT UNION MEETING OF THE NEW JERSEY AND PENNSYLVANIA STATE DENTAL SOCIETIES.

THE following committees have been appointed for the joint union meeting to be held at Cresson Springs, Pa., to commence on the evening (8.30) of Wednesday, July 20, 1892, by the official executive committees of the Pennsylvania and New Jersey State Dental Societies, held in the city of Philadelphia, Saturday, January 30, 1892:

FOR NEW JERSEY.

Clinics.—S. C. G. Watkins, Montclair; R. M. Sanger, East Orange; A. R. Eaton, Elizabeth.

Accommodations.—Chas. A. Meeker, Newark; Fred. A. Levy, Orange.

Exhibits.—C. W. F. Holbrook, Newark; Oscar Adelberg, Elizabeth.

Essays.—S. C. G. Watkins, Montclair; Harvey Iredell, New Brunswick; C. S. Stockton, Newark.

Clinical Conference.—Henry A. Hull, New Brunswick.

Dental Literature.—W. L. Fish, Newark; A. Westlake, Elizabeth.

Dental Mechanical Appliances.—G. E. Adams, South Orange; A. R. Eaton, Elizabeth; F. C. Barlow, Jersey City.

Dental Materia Medica.—C. S. Stockton, Newark; Walter Woolsey, Elizabeth; Thomas Moore, Paterson.

Prosthetic Dentistry.—C. W. F. Holbrook, Newark; W. E. Truex, Freehold; F. W. Kitchell, Perth Amboy.

Transportation.—Geo. C. Brown, Elizabeth.

Press.—F. C. Barlow, Jersey City.

Program.—Chas. A. Meeker, Newark.

FOR PENNSYLVANIA.

Clinics.—P. K. Filbert, Pottsville; W. E. Van Orsdell, Sharon; W. F. Fundenberg, Pittsburg.

Accommodations.—W. H. Fundenberg, Pittsburg; W. B. Miller, Altoona.

Exhibits.—D. N. McQuillen, Philadelphia; A. B. Abell, Philadelphia.

Essays.—Louis Jack, Philadelphia; C. S. Beck, Wilkes-Barre.

Clinical Conference.—W. E. Magill, Erie.

Dental Literature.—G. W. Klump, Williamsport; J. C. M. Hamilton, Tyrone.

Dental Mechanical Appliances.—Joseph Head, Philadelphia; E. P. Kremer, Lebanon; S. H. Guilford, Philadelphia.

Dental Materia Medica.—Henry Leffmann, Philadelphia; E. C. Kirk, Philadelphia; C. N. Peirce, Philadelphia.

Prosthetic Dentistry.—J. A. Libbey, Pittsburg; Wilbur F. Litch, Philadelphia; Howard E. Roberts, Philadelphia.

Transportation.—J. M. Young, Wilkes-Barre.

Press.—L. Ashley Faught, Philadelphia.

The chairmen of the different committees will please communicate with the several members of committees, and arrange to have the matter for publication sent to the secretary, by June 20, as the program this year is expected to eclipse any former one issued. CHAS. A. MEEKER.

NEW JERSEY DENTAL COMMISSION.

THE next meeting for examinations of the New Jersey State Board of Examiners will be held at the office of the secretary, No. 88 Broad street, Elizabeth, N. J., on Tuesday, April 19. Candidates will please file their applications with the secretary before April 5. Papers and information furnished on application.

Notice is hereby given that hereafter the board will meet for examinations on the third Tuesdays of April, July, and October only.

G. CARLETON BROWN, *Secretary*,
Elizabeth, N. J.

MISSISSIPPI VALLEY ASSOCIATION OF DENTAL SURGEONS.

THE next meeting of the Mississippi Valley Association of Dental Surgeons will be held in Cincinnati, O., March 8 to 11, 1892.

Papers will be read on the following subjects: "Injury to Superior Incisor Teeth: supposed Agency of Phagocytes in effecting a Cure," by Dr. H. A. Smith; "A New Oxyphosphate," paper and clinic, by Dr. W. B. Ames; "Mechanical Treatment of Cleft Palate," by Dr. G. Mollyneaux; "On Edge," by Dr. C. M. Wright. Drs. W. N. Morrison, J. R. Callahan, and M. H. Fletcher will also read papers on subjects to be announced.

L. E. CUSTER, *President*, Dayton, O.

VERMONT STATE DENTAL SOCIETY.

THE sixteenth annual meeting of the Vermont State Dental Society will be held at Burlington, Vt., March 16, 17, and 18, 1892.

A cordial invitation is extended to all members of the profession. Reduced rates on all railroads. THOS. MOUND, *Secretary*, Rutland, Vt.

THE next annual meeting of the Vermont Board of Dental Examiners will be held at the Van Ness House, Burlington, Vt., Wednesday, March 16, at two o'clock P.M. Applicants for examination will please report promptly at that time. R. M. CHASE, *Secretary*, Bethel, Vt.

KANSAS STATE DENTAL ASSOCIATION.

THE twenty-first annual meeting of the Kansas State Dental Association will be held at Fort Scott, April 26, 27, 28, and 29, 1892. Members of the profession are cordially invited to meet with us.

C. E. ESTERLY, *Secretary*,
Lawrence, Kansas.

POST-GRADUATE DENTAL ASSOCIATION OF THE UNITED STATES.

THE Post-Graduate Dental Association of the United States will hold its annual meeting April 29 and 30, 1892, at the Leland Hotel, Chicago. Dr. W. C. Barrett, of Buffalo, N. Y., Drs. T. W. Brophy, Louis Ottofy, and others of Chicago, will present essays and addresses. An interesting program has been arranged, and a good attendance is expected. All members of the profession are invited.

Graduates of recognized dental colleges may become members by paying membership fee ($1.00), and dues for one year in advance ($1.00).

R. B. TULLER, *President.*
L. S. TENNEY, *Secretary,*
96 State street, Chicago.

ALUMNI ASSOCIATION OF THE PHILADELPHIA DENTAL COLLEGE.

THE Alumni Association of the Philadelphia Dental College has issued no such call for a meeting as appears in the February number of the DENTAL COSMOS.

ALONZO BOICE,
L. ASHLEY FAUGHT,
JOS. R. C. WARD,
J. LEHMAN EISENBREY,
FRANK L. BASSETT,
} *Executive Committee.*

ALUMNI ASSOCIATION, NEW YORK COLLEGE OF DENTISTRY.

AT the annual meeting of the Alumni Association of the New York College of Dentistry, the following officers were elected for 1892: J. Howard Reed, president; M. C. Gottschaldt, first vice-president; Alfred R. Starr, second vice-president; Vincent M. Munier, secretary; Zachary T. Sailer, treasurer; Sherman B. Price (chairman), H. J. Parker, E. S. Robinson, executive committee.

After the regular meeting, to be held at Delmonico's, March 9, 1892, the association will partake of its annual dinner. Further information can be obtained from the chairman of the executive committee, 13 West Thirty-second street, New York.

VINCENT M. MUNIER, *Secretary.*

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EDITORIAL.

PROFESSIONAL DEVELOPMENT IN DENTISTRY.

THE tendency of individuals to form aggregations for the consummation of a desired end is a biological fact, and pervades the entire animal kingdom. It is a factor upon which in most instances the conservation of the species depends. Wherever the struggle for existence involves the overcoming of conditions beyond the power of individual effort, the love of life, the instinct of self-preservation, results in the tendency referred to, which is an inherent quality of the individual. The organization of any given aggregation of individuals is conditioned by the character of the end to be attained. With all animals below man no higher object than the conservation of the individual can be said to exist. With man, however, the evolutional development of this instinct of self-preservation has produced a complex variety in the character of his social and communistic organizations in harmony, more or less, with his material and intellectual requirements. The necessity for the existence of the community or race, as such, as well as its ability to exist being greater than that of the individual, comes to be recognized either objectively or subjectively by the individual, hence there is developed in him the instinct which has for its object the conservation of the community of which he is a part ; his egoistic tendency or individual-self instinct becoming modified or dominated by his altruistic tendency or tribal-self instinct. In other words, there is developed the moral quality which leads him to regard the rights and desires of others as of equal importance to his own, and to formulate the golden-rule maxim which in substance is the ethical formula of all nations or communities of people sufficiently advanced in their mental development to possess a moral code. The process of natural selection may be regarded as an adaptation of means to ends, and the principal factor in the developmental process. Its operation as a factor in development up to a certain point is reasonably clear. Its relation to the faculty of human intelligence is more complex, apart from which, while its operations proceed with regularity, it is comparatively slow in the production of results. But through intelligence—that quality of the human mind whereby we are able to form a mental image of the end desired, be it material or abstract—the adaptation of means to ends is more readily accomplished and results are more rapidly attained. It is this quality of intelligence as modified by the self-instinct in its relations of individual self and the so-called tribal self which immediately concerns us in the consideration of any co-operative effort having for its object an improvement in the condition of any given class of people, and the character of the object is the measure of their intellectual development ; that is, the end sought becomes higher and less selfish in proportion as it is actuated by the instinct which conserves the interests of the community.

The application of these general biological principles to the question of dental professional development will afford an opportunity to examine what possibilities for the improvement of dental professional interests may ensue, through properly directed efforts from this standpoint.

The growth of dentistry has proceeded along two distinct lines, viz : its technical phase and its professional. Its earlier or formative stage was characterized by activity in its development as an art with a corresponding lack of interest in the scientific principles upon which the art is based, and with an almost entire disregard of the professional and ethical factors which have come in time to form the basis of its claim to a place in the ranks of the acknowledged professions. Its organizations, which at first concerned themselves almost exclusively with the material methods of practice, gradually realized the necessity for a more extended and broader education of its individual members, with the result that topics now most earnestly studied are those relating to education, legislation, ethics, and scientific questions bearing not only upon dental art, but in special degree on any and all problems tending to the improvement and elevation of dentistry as such. The tribal instinct of dentistry, so to speak, has come to be a characteristic of its individual members to a degree which largely dominates the individual-self instinct.

While it is difficult if not impossible to formulate a general expression which shall be broad enough to include all the stages of development represented in a heterogeneous collection of individuals, a careful examination of the present attitude, toward their profession, of the majority of dental practitioners, as compared with that of those concerned with its earlier periods of growth, cannot fail to clearly show the positive advance which has been made along the line of professional progress ; and the term is here used to signify specifically all that is included in the term professional.

It remains to examine to what extent this growth of professional instinct should be regarded as a modifying influence in the character of dental organizations and in the objects of dental co-operative effort.

The dental profession has fully demonstrated its desire and capacity to organize for any object which sufficiently justified it. A survey of the past work of dental organizations shows a progressive development in the kind of work done, with a corresponding advance in the nature of its object, viz : from distinctively individual interest to the general, altruistic, and professional.

It is significant that not only is such the character of the advance made, but that it is in strict harmony with the natural method of ethical evolution.

That it will proceed inevitably toward a higher degree of perfection cannot be doubted by any who will study the matter in its broader relations. The rate of progress can, however, be largely increased by a recognition of the fact, before stated, that the necessity for the existence of the class as well as its ability to exist is greater than that of the individual. Nature creates individuals that she may preserve the life of the community, hence the duty of the individual toward the same end.

The lack of altruistic motive which characterized the earliest dental efforts was at the time perhaps comparatively unimportant; to-day wherever it exists it constitutes an element not only of weakness but of positive interference with professional growth.

The only true progress toward the goal of professional ambition must be made through organized effort to improve the character of dental professional standards, and this in turn can only be done by a realization on the part of its individuals that work done for the profession as such—work done unselfishly for the good of the whole dental body—is not only with the right purpose, the accomplishment of which is its own reward, but that the profession to-day demands it of its members, failing in which they fail of their right to professional standing.

WORLD'S COLUMBIAN DENTAL CONGRESS.

THE corrected list of committees of the World's Columbian Dental Congress has not been issued up to the time of our going to press. We regret therefore that we are unable to publish the matter until the April issue of the DENTAL COSMOS. The preliminary work of several of the more important committees has, however, been commenced, and the plans so far contemplated, if successfully carried out, promise to result in a congress which in respect to size, character of scientific work, and general dental interest will far surpass any similar effort in the history of dentistry.

BIBLIOGRAPHICAL.

MANUAL OF INSTRUCTION IN HARD SOLDERING. By HARVEY ROWELL. E. & F. N. Spon & Co., New York and London. Pp. 56. Price, cloth, 75 cents.

This small monograph consists of a collection of directions relating to the details of hard soldering, with formulæ for making the solders used for the limited class of operations of which examples in illustration are given. It deals principally with the process as related to the soldering of the common metals and objects made from them. It contains some hints that might be serviceable in the dental laboratory, but the author could have added much to the general usefulness of the book if he had made himself familiar with the principles and details of the art as taught in dental schools and text-books, which is part of the elementary knowledge of every dentist.

DENTAL-KALENDER FÜR DEUTSCHLAND, Oesterrich-Ungarn und die Schweiz. 1892. V Jahrgang. Leipzig, G. Thieme.

The Dental-Kalender consists of two parts, the first of which is a pocket diary, and the second a corrected list of dental practitioners throughout the German Empire, Austro-Hungarian Monarchy, Switzerland, Belgium, Holland, Denmark, Sweden, Norway, and Roumania, with additional valuable information respecting the personnel of the dental profession in the countries named.

OBITUARY.

DR. GUSTAVUS N. SNOW.

DIED, at Hartford, Conn., January 27, 1892, of cerebral meningitis, GUSTAVUS NORDHAL SNOW, M.D., D.D.S., in the forty-eighth year of his age.

Dr. Snow was born in Providence, R. I., October 30, 1844. The earliest part of his life was spent in New York City. When the rebellion broke out he enlisted at the age of seventeen, in the Thirteenth New York Heavy Artillery, in which he bravely served during the entire war, being twice wounded. After his discharge he spent some years in Deep River, Conn., which town he represented in the legislature in 1874.

He was a graduate of Jefferson Medical College, and valedictorian of the class of 1875, at the Philadelphia Dental College. He located in Hartford about fifteen years ago, and while patiently waiting for a practice, "holding strictly to the code of ethics," he studied the mechanical treatment of Riggs's disease under the instruction of the late Dr. John M. Riggs, and was Dr. Riggs's only successor. After about five years he gained a large and lucrative practice. He was a thorough and conscientious operator, making a specialty of the treatment of Riggs's disease.

Dr. Snow's unusually large fund of information and ready wit made him a valuable and highly appreciated member of the social life in the western part of the city where he resided. The remains were interred at Deep River, Conn., with military honors by Mather Post, G. A. R.

One who knew him well writes that Dr. Snow's life was a model of "temperance, benevolence, chastity, and loving-kindness." He leaves a wife, *née* Miss Josephine H. Lockwood, of Philadelphia, Pa., and one son seven years old.

DR. CHARLES P. PENGRA.

DIED, in Boston, Mass., January 31, 1892, DR. CHARLES P. PENGRA, aged thirty-one years.

The earlier portion of Dr. Pengra's life was spent in Michigan. At the age of nineteen he had completed the course of study in the Medical Department of the University of Michigan, but on account of his youth the degree was withheld until the following year, 1881. In 1883 he received the degree of Pharmaceutical Chemist from the same university. During 1881–1884 he was assistant to Professor V. C. Vaughn, physiological and sanitary chemist, at the University of Michigan. In 1884 he assumed the chair of Materia Medica and Botany in the Massachusetts College of Pharmacy, Boston. He was also for the past five years Professor of Dental Histology and Microscopy in the Boston Dental College. Both of these positions he held at the time of his death.

Dr. Pengra was a Fellow of the American Association for the Advancement of Science, and of the Massachusetts Medical Society, and was a member of the convention for revision of the United States Pharmacopœia, 1890. He was an original investigator, being especially known for his researches upon the purification of water by freezing.

Professor Pengra was a favorite with his classes, being clear and thorough as a teacher, and possessed of the rare quality of interesting his students in the subjects which he taught. The Faculty of the Boston Dental College have lost an efficient working member of the teaching force, and its students an able instructor.

The following resolution, as prepared by their committee, was adopted by the Faculty:

" *Resolved*, That this expression of their appreciation of Professor Pengra's valuable services, together with the above memorial, be spread upon the college records, and that a copy be transmitted to his sorrowing wife, to whom the Faculty tender their sincere sympathy; also,

" *Resolved*, That a copy be sent to the leading dental journals for publication."

DR. HENRY L. WILLIAMS.

DIED, at Woodstock, Vt., February 2, 1892, of heart-failure, DR. HENRY L. WILLIAMS, in the seventy-sixth year of his age.

Dr. Williams was born at Royalton, Vt., on the 29th of November, 1816. He studied medicine at the Vermont Medical College at Woodstock, and graduated at that institution in 1842. He afterward attended the University Medical School of New York, then under the direction of the famous Dr. Valentine Mott. He practiced medicine at Northfield, Stockbridge, and Pomfret, embracing altogether a period of about twelve years, but finding his health failing in that profession, decided to take up the study of dentistry, which he pursued with Dr. Hitchcock, of Boston, and subsequently established himself in practice in that city. In 1855 he settled in Quechee, where he remained about ten years, and then removed to Woodstock, which continued his place of business for the remainder of his life.

Dr. Williams was a man of much uprightness and integrity of character; was a careful operator, pleasant and considerate with his patients, and had an extensive practice. He was married in 1844 to Miss Jane Tinkham, of Pomfret, who with one son survives him.

DR. JAMES M. STEWART.

DIED, at Clearfield, Pa., on Monday, February 1, 1892, of cancer of the stomach, DR. JAMES M. STEWART, in the fifty-fifth year of his age.

Dr. Stewart was born in Huntingdon County, Pa., January 4, 1838. He took a collegiate course at Westminster College, Meadville, Pa., and later began the study of dentistry with the late Dr. M. L. Logan, of Tyrone, Pa. He graduated from the Pennsylvania College of Dental Surgery in 1871, and immediately removed to Curwensville, Pa., where he practiced six years. In 1877 he removed to Clearfield, where he resided up to the time of his death. In 1874 he became a member of the Central Pennsylvania Dental Association, and later was elected its president. He was also a member of the State Society.

Dr. Stewart was a man of extremely genial disposition and exalted Christian character. He was a skillful dentist, and enjoyed a lucrative practice. He was married in 1862 to Mattie Work, of Crawford County, Pa., who with one son survives him. W. R. M.

DR. JOSEPH A. SWASEY.

Joseph A. Swasey, D.D.S., only son of Dr. James A. Swasey, of Chicago, died recently in that city, in the twenty-sixth year of his age.

Dr. Swasey studied dentistry with his father, and was a graduate of the Chicago College of Dental Surgery, class of 1889. He had been in practice with his father since that time. He was of a genial disposition, and had consequently made many friends, who feel the keenest sympathy and regret for his untimely decease.

IN MEMORIAM.

DR. JAMES W. WHITE.

Died May 27, 1891, aged sixty-four years.

Dr. White was a member of the firm of Hance Brothers & White, manufacturing chemists of this city. His death, which was unheralded by any previous sickness, was caused by heart-failure and was immediate.

Dr. White, though not brought into close association with the members of the Exchange, was, by reason of his prominence in philanthropic and scientific circles, no stranger to them. Those among them who were personally acquainted with him will for many years hold pleasant memories of his genial nature, his well-stored mind, his quick humor and rare conversational talents. Still longer will linger in their remembrance the sterling characteristics inseparable from a life passed in a conscientious adherence to principle, and a fearless discharge of duty in every relation thereof.—*Extract from the Thirty-first Annual Report of the Philadelphia Drug Exchange, January 26, 1892.*

DR. CHARLES A. KINGSBURY.

The following resolution was passed at the last meeting of the board of directors of the Philadelphia County Dental Society:

Whereas, It has pleased our Heavenly Father to call to rest Dr. Charles A. Kingsbury, our friend, associate, active member, and one of the founders of this society; therefore be it

Resolved, That we desire to express our high esteem for one whose faithful and earnest work is widely known throughout the profession; and

Resolved, That this record of our deep regret be entered upon the minutes of this society, and a copy of these resolutions be sent to the dental journals for publication.

L. Ashley Faught, *Secretary.*

MR. GEORGE CLAUDIUS ASH.

THE death of Mr. Ash occurred in London on January 17, in the seventy-eighth year of his age, from an attack of influenza. Mr. Ash was for many years senior partner of the firm of C. Ash & Sons, Limited, of London, manufacturers of and dealers in dental supplies. He was originally apprenticed to the late Mr. Thompson, of London, with whom he studied dentistry and afterward entered into practice as a dental surgeon, but subsequently retired to devote himself exclusively to the business established by his father, the late Claudius Ash. He was for a long time in charge of the manufacturing department of the concern, to which he devoted great care and attention. Mr. Ash was highly respected, both as an employer and in all the relations of life. His loss will be keenly felt by all who were associated with him.

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PERISCOPE.

PENTAL AS AN ANESTHETIC.—Brener, in a communication to the Royal Medical Society of Vienna, reports having used pental as an anesthetic one hundred and fifty times in his dental practice. Loss of sensation is produced before complete loss of consciousness. Usually the patient recovers quickly and easily. The effect is produced generally in one or two minutes, and requires ten to fifty grammes. According to Rogner in the *Wien. Med. Pr.*, 1891, and Hollander in *Nouv. Rem.*, 1891, the loss of sensation lasts about four minutes, and toward the end of the seventh minute passes away. There is no vomiting or other troublesome symptom during the inhalation, nor does headache or sickness occur afterward. The loss of consciousness comes on during the first few minutes, with complete loss of voluntary movement. Rogner considers it the best anesthetic to use in minor surgery. In spite, however, of these favorable reports, Brener himself had a serious accident. A girl who required extraction of a tooth was placed under the effect of pental. She had only taken four grammes when alarming symptoms arose,—syncope, apnœa, loss of pulse, and dilatation of the pupil. It was necessary to resort to artificial respiration to restore consciousness. This fact, as Basch and Dittel observe, proves that new anesthetics, and especially those producing rapid narcosis, require great care in their employment.—*Lancet*, February 6, 1892.

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HINTS AND QUERIES.

EDITOR OF THE DENTAL COSMOS:

Sir,—I have just read in the February number of the DENTAL COSMOS the article by Rodrigues Ottolengui, M.D.S., on "Methods of Filling Teeth," in which he makes the following comparison:

"Passing now to foil, I have to consider briefly the various forms in which it is supplied. In the first place there is the condition of the surface. We find this either bright as though burnished, or rough, appearing as if 'frosted.' This style of gold has various names, depending upon the maker. I do not remember any special advantage that has been claimed for it, and it is probably manufactured to supply a demand created by a habit, rather than by reason; on the contrary, my own experience with it would condemn it. It is less cohesive than the plain, and this is seen to be natural upon a moment's consideration. The adherence of one thing to another may be produced at any time by effecting absolute contact. Glass, which we would not count as possessing the property of adhesiveness, will develop the property if two smooth pieces be wet and laid one upon the other. There is nothing sticky about the water, and its action is simply in completing the contact. Therefore *smooth* gold should be more cohesive than *rough*."

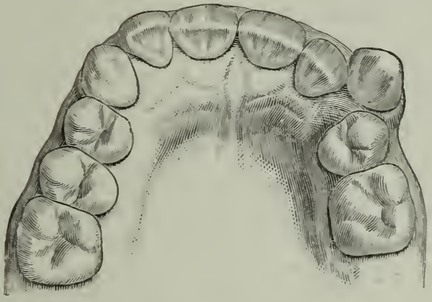
I regret very much that the doctor has weakened a good article by such a statement, as his use of the words *adhesive* and *cohesive* is very misleading. I do not see by what train of reasoning he has proven that rough gold is not cohesive because smooth wet glass is adhesive; for with as much logic it might be proven that one man was not white because another one is black. If the doctor will but give a "moment's consideration" to his logic, I think he will agree with me that he has made a mistake. A sheet of smooth tin may be placed upon a piece of wet glass, and it will adhere just the same as two pieces of glass; but a sheet of dry tin foil laid upon a sheet of dry gold foil, be it rough or smooth, will never cohere with it.

Then again, if the doctor will take the same two pieces of flat, smooth glass, that have developed the property of adhesion, and grind their surfaces, upon their being wet he will find they have not suffered any loss of their adhesive properties by the operation. I do not wish to be considered as being a champion of any particular style of gold, but believe in giving all styles a chance, and using the one from which we obtain the best results.—R. W. STARR, Chicago, Ill.

RAPID REGULATING.—A recent case which was presented for the correction of an irregularity was treated in the following manner. The age of the patient was twenty-two, and he was a large, well-developed man.

The plaster cast represented in Fig. 1 was made October 11; a hickory-wood wedge was inserted between the left lateral and second bicuspid, and the patient instructed to renew it every third day. On October 18 a plaster impression was taken, and a "Melotte metal" cast made. The wedging was continued another week, during which time the accompanying device was made and adapted to the metal cast, as shown in Fig. 2, and applied October 25. On November 1, the length of the screw having been traversed by the nut, the longer brace shown in Fig. 3 was inserted. On November 8 the screw was again exhausted, and the teeth in position as represented in Fig. 4, which shows the retaining appliance made by banding the cuspid, tubing it transversely on the lingual surface, and inserting a gold-plated piano wire, No. 15,

FIG. 1.



through the tube resting against the first molar, second bicuspid (first bicuspid missing), lateral and central incisors.

It will be observed that the appliance was worn but two weeks; that the patient was seen but once in the mean time; that the patient had full control of the movement, and had done all the preliminary wedging except in the first instance.

Fig. 2.

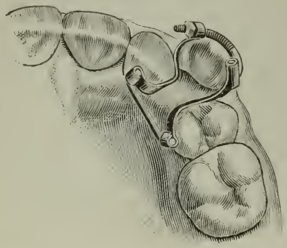


Fig. 3.

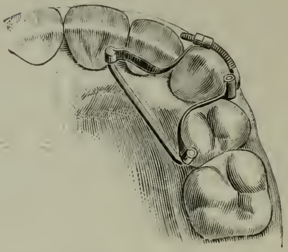
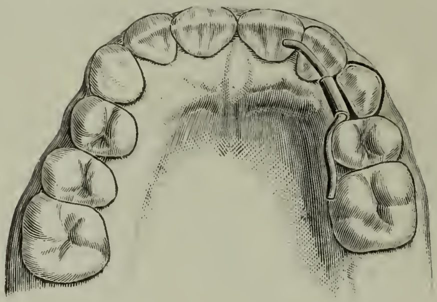


Fig. 4.



The appliance was made entirely of German silver, and the nut was turned with a patent (split) watch-key obtainable at any jewelry store.—A. E. Matteson, D.D.S., Chicago, Ill.

A Good Filling for Deciduous Teeth.—In filling deciduous teeth it is often almost if not quite impossible to exclude moisture from the cavity sufficiently to permit filling with zinc phosphate, unless the rubber-dam is used. The difficulty may be overcome in the following manner: Place some of the powder on a glass slab, also a little of the fluid, and beside these a little chloro stopping.* Make a rather thin mix of the zinc phosphate, then add to this the chloro stopping, mixing in more of the powder until a thick putty-like consistency is obtained; now napkin the mouth, and dry as well as possible (I prefer cottonoid napkins for this), immediately packing to place, and finishing with burnishers. When it has been impossible to exclude moisture, the filling has been placed in under water, and on removal some time afterward was found adhering to the walls of the cavity. Some of these fillings have stood for nearly a year, and are still good, showing very little wear.—S. Eldred Gilbert, D.D.S., Philadelphia.

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*Chloro stopping is made by dissolving Gilbert's white temporary stopping in chloroform.

A Novel Articulator.—The form of articulator here described is simple, effective, and easily made. It is very satisfactory for crown-work or small pieces of bridge-work, and has some points of special advantage which a description of it will make clear. For its construction brass tubing of two sizes is used,—the larger about three-eighths of an inch diameter, and the smaller of a size to fit within it and telescope easily without loss of motion.

Place the models in proper occlusion, and measure the distance from the top of the upper model to the bottom of the lower, and make the length of the post or inside tube three-eighths of an inch less. Drill a hole and solder a pin in this post one-half inch from the end, and then solder a square piece of sheet brass (which should not be much larger than the tube) to the end nearest the pin for the base of the post.

With the edge of a thin file cut a slot in the end of the outside tube or casing one-quarter of an inch long. The pin in the post should fit this slot closely to prevent any rotation of the models until separated far enough to clear the cusps of the teeth. Cut this casing one-quarter of an inch shorter than the post, and solder a cap on the end opposite.

Fig. 1.

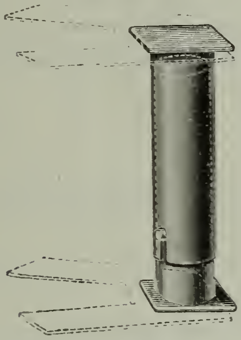
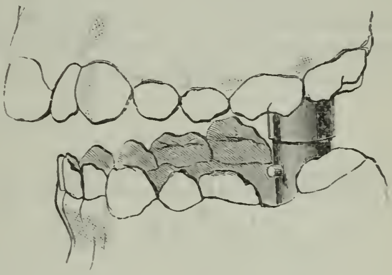


Fig. 2.



To mount models, cut a hole the size of the casing in the center of the palatine arch on a line just posterior to the second bicuspids, and countersink from the top so that the cap of the casing will be imbedded in plaster when filled. Now place the casing in this upper model, and secure it in proper position with wax on the palatine side, and fill the countersink with plaster, being sure that this is large enough, and rough to let the plaster run freely under and around the cap and retain it. When this has set, place the post in the casing and then cut and mortise the lower model to receive the base of the post when the models are in proper occlusion. Hold them in this position, and carry plaster well around and under the base of the post, and do not disturb it until set.

The plaster for setting these tubes should be mixed *thin*, so that it will run well around and under the caps; and if the models are dry they should be soaked in water a few minutes before attempting to mount.

Should it be preferable to preserve the palatine arch free from obstruction, the tubes may be set as far back as desired by extending the caps on the tubes forward in the form of a small articulator. (See dotted lines on Fig. 1. Fig. 2 exhibits the general arrangement, with models separated, showing the pin and slot of the telescoping tubes.) In mounting in this manner the base should be set in the lower model first. This form makes a very perfect articulator for crown- or small pieces of bridge-work.

Memoranda may be made on small slips of paper and placed inside of the inner hollow post for future reference. The telescope tubing may be ordered through any hardware store.—H. F. Harvey, D.D.S., Cleveland, O.

Chloride of Zinc as an Obtundent of Sensitive Dentine.—Chloride of zinc possesses qualities of special value as an escharotic obtundent, the most satisfactory results being obtained when it is used in the solid form. The principal objection to its use is the pain caused by the application. This may, however, be largely avoided by the previous use of cocaine crystals or Robinson's remedy, after which a small quantity of solid zinc chloride applied directly to the surface will completely destroy its hypersensitiveness. The use of solid zinc chloride in this manner is not dangerous to the pulp unless the latter is nearly exposed. The density of the coagulum formed by the albuminous contents of the tubuli and the zinc chloride renders its action self-limiting and more or less superficial. It is preferable to make repeated applications during the process of excavating, rather than to allow such strong remedies to act for a considerable length of time, *i.e.*, by sealing them in with dressings to remain from one sitting until the next —E. C. K.

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

The abbreviations of titles used are those common to bibliographical work, and will, it is presumed, be readily comprehended by any one familiar with dental or scientific publications. Any explanation will be gladly furnished by the compiler. A star (*) indicates a Thesis.

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LIST OF UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING JANUARY, 1892.

January 5.—No. 466,462, to J. F. Hammond. Hand-piece.
“ “ No. 466,464, to Hood & Reynolds. Dental bracket.
January 12.—No. 466,961, to C. P. Gray. Dental plugger.
January 26.—No. 467,738, to W. P. Horton, Jr. Adjustable electrode.
“ “ No. 467,799, to David Genese. Drill.

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ORIGINAL COMMUNICATIONS.

A STUDY OF THE DEGENERACY OF THE JAWS OF THE HUMAN RACE.

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IN the scientific study of the evolution of the human race, man must be studied as an animal and the subject must be considered from two standpoints, because two structures are involved: first, the nervous system, and second, the osseous system. In the evolution of man great changes take place, and these changes are not unlike the modeling of a human being in clay. The sculptor, after he has fashioned his subject in a general way, adds small pieces of clay at one place and removes them from other places. Little by little these changes are made, until the clay begins to take on shapeliness and finally becomes a thing of beauty. So it is with the development of man. The orang and the chimpanzee represent the clay fashioned relatively less perfect. The changes which then take place in the development of man are as great, if not greater, than those which take place in the development of a clay model. Having the framework to build upon, the brain commences to develop, and in its development the osseous system must be reduced at one point and built out at another. The animal which possessed only instinct now begins to reason and think for himself. Then he depended upon nature for his food, for his subsistence; now he commences to collect material and to prepare his food by cooking. The continual development of the nervous system is accomplished at the expense of the osseous system. Thompson says,* "The structure of the face arose from its parts having been created for the accommodation of the speech and sense-organs, and upon these foundations the facial features were constructed, and facial expression became possible. The invertebrate animals have the special sense-organs scattered over the entire body, so that there is really no face, strictly so called, until we reach the vertebrates, where the face and special senses are located within a limited area upon the front of the head."

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*DENTAL COSMOS, 1890, pp. 633, 683.

The animal depends upon its physical strength for its food and for protection. The bony framework is very strong. The bones are large, long, and the prominences upon their surfaces for the attachment of muscles are very marked, thus indicating that the muscles are large and strong. As we ascend the scale to man, we find that the bones are smaller in diameter, and shorter, showing that the muscles are not so large and strong. Great changes take place in the jaws and teeth. They become smaller in size, the teeth change their shape, because man now is no longer required to procure his food with his teeth or to protect himself by his jaws. The brain is continually enlarging and changing its shape, and the bones of the head, especially the parietal and frontal, expand forward, laterally, and upward. The temporal muscle, zygomatic arch, and jaws decrease in size and are not so prominent. If we compare the jaws of the orang and chimpanzee with that of a negro, we observe a wonderful difference as regards size, shape, and character of the teeth. If we will now compare the negro jaws with those of our working-classes, and these latter with the jaws of young people of the well-to-do class, who are not required to work physically, we shall observe almost as great a change as we noticed in the case of the orang and the negro. These changes are the result of the law of compensation. The tendency of the human race is to develop in an intellectual line, and if the race seeks a high education and brain-development, without a corresponding physical training, the result is a fully developed cerebrum and a weak physical structure. Our food is now prepared in such a manner that mastication is almost unnecessary, and arrest of development of the jaws and decay of the teeth must follow as a result. Comparing the shape of the face, head, and general make-up of the present people with those of our ancestors, there can be no question that the human race is improving in grace, beauty, and intellect. The changes which occur in the general outline of the head and jaws in a few generations, are excellently illustrated in the following portraits of a noted family in this country. Four generations are here shown, in the order in which they lived. The cuts are drawn from daguerreotypes and photographs, and of course are useful only in giving the general outlines of the shapes of the heads. Unfortunately, the hair upon the faces depicted in the last two illustrations forbids any comparison being made so far as the jaws are concerned. There is, however, such a contrast in the shapes of the heads that those who are familiar with craniology can readily trace the changes which would naturally take place in the shapes of the jaws.

Fig. 1 represents a man born in Connecticut in 1761; died in 1826. This picture represents a brachycephalic head with massive jaws, prominent lips, especially the upper. The nose is long, and the eyes are set close together; the forehead very high and straight.

Quite a change is noticeable in the second generation, depicted in Fig. 2. The face is not so long, the lateral diameter of the head is larger, the forehead more prominent, and the eyes are a little farther apart. The nose is about the same length, and while there is a general resemblance about the mouth and chin, the distance from the front of the chin to the tip of the nose is not quite so long. The change seems to be in the shortening of the chin.

FIG. 1.

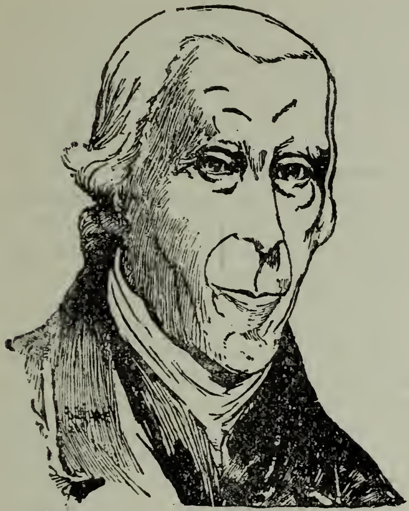

FIG. 2.

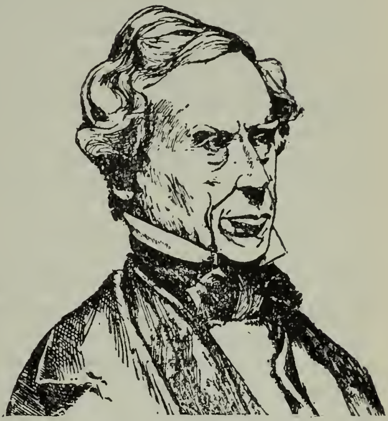

Fig. 3 shows still further change. The forehead is broader and less retreating than either. There is perceptibly less prognathism. There is less prominence in the supraorbital region.

FIG. 3.

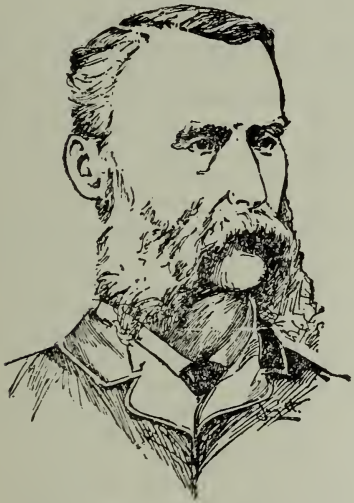

FIG. 4.

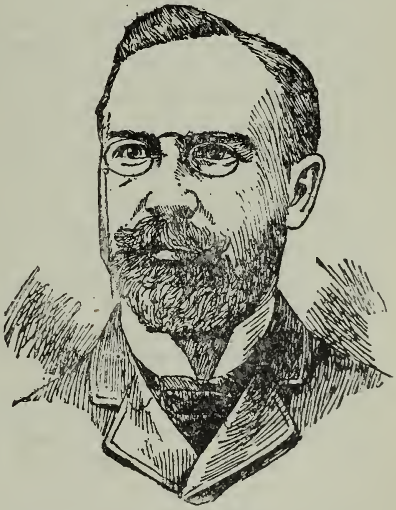

Fig. 4 shows a head just the opposite of Fig. 1. This is a dolichocephalic head. The head is nearly round; forehead full; eyes set in the head to correspond with the width of the head; nose broad; upper lip short, and lower jaw much broader than in Fig. 1. The lower jaw is evidently much shorter in a perpendicular line. These changes are due to a protruding forehead, receding chin, and delicate features.

As we shall see later on, children born of neurotic parents are apt to inherit brilliant minds and very weak constitutions. They are very bright scholars, always standing at the heads of their classes. Such children are very susceptible to disease, and it not infrequently happens that when disease comes, death is the result. If they grow up, they frequently become geniuses or insane, drunkards, criminals, or egotists. There is a reason for this change of structure, in the building up of the nervous system and arrest of development of the osseous system. The food taken into the stomach contains a large amount of the phosphates of calcium, sodium, etc. This material (if assimilated) goes to form brain, bone-substance, and teeth. If the brain becomes more active than the osseous system, more blood will go to the brain, and therefore will deposit the phosphates for the purpose of repair, at the expense of the osseous system. If the jaws then are not exercised, blood will not flow to them, and arrest of development and atrophy are the result. This statement is a matter of fact, observed by every one of experience. Let a child visit his dentist and have his teeth put in order; he then goes to school or college; on his return to the dentist at the end of the year, he will find in many cases that the teeth have decayed around the fillings, and in new places. This occurs to a greater extent at this time than at any other during the growth of the individual. This shows conclusively that during the past year the brain has been more active than the physical part of the person. This fact is also nicely illustrated in a case now under my care. Miss H., thirteen years of age, of very slight build, bones very small for her age, is of very nervous temperament; cries without the slightest provocation, and has incontinence of urine. Is constantly doing things at home that she ought not to do, for which she is being continually punished by her parents, who are not aware that she is not responsible for her acts. She goes to school, is very bright, and learns her lessons apparently without much effort. She eats and sleeps well, is very fond of meat, which she eats largely, and does not like milk. She is under treatment by her family physician. She was sent to me because of the peculiar condition of her mouth and teeth, which revealed to me the whole cause of her trouble, and to my mind she is one of the most interesting cases I have ever seen, nicely illustrating the point under discussion. All the teeth were yellow, and when an instrument was passed over the outer surface, the enamel (which should be as hard and smooth as glass) could be easily scraped off like horn. All the teeth were completely covered with tartar. When the instrument was applied for the purpose of the removal of the tartar, the little girl would wring her hands and cry, seeming to be in great agony. The teeth had spells of aching; sometimes the aching would be in one tooth on one side, and sometimes in another tooth upon the other side. This pain was most intense, neuralgic in character, lasting from ten minutes to one hour. There are no cavities in the teeth. Although the child is taking plenty of nourishment, it will be observed that the phosphates and carbonates are not assimilated, as indicated by the nervous and osseous systems, and also by the teeth. The large amount of tartar upon her teeth is positive proof that there is lack of assimilation. Tartar should not accumulate upon the teeth before the person has attained his growth, say at the twenty-sixth year, and the fact that it is deposited in such large quantities, and at this early age, shows that the phosphates are excreted by the salivary glands. The tartar being alkaline, prevents the decay of the teeth. Thus we have seen that the phosphates are necessary for the development of the bone as well as of the brain, and that the excessive development of one structure must necessarily be accomplished at the expense of the other.

In the study of evolution, no part of the body has received so much attention as that of the maxillæ and cranium. There are two reasons for this : one is that greater changes are noticeable in these structures ; second, the close proximity of the maxillæ to the cranium, and to each other, permits them to be easily studied, and changes are more easily noticed.

Vogt says,* "The skull is chiefly important from its investing the brain so closely that its chief features are impressed on the inner surface of the cranium." Although the jaws have to a certain extent been taken into consideration in the study of evolution, the cranium has received the greater attention of the two osseous structures. The changes which have taken place in the jaws have only been studied by scientists in a general way. I shall therefore, as a specialist, study this subject in its details. The quotations as far as possible will also be taken from articles written by specialists. By so doing we shall obtain the facts as they appear to those who are constantly operating upon the mouth, jaws, and the teeth.

Following a law of evolution pointed out by Ray Lankester,† certain conditions become, under changed conditions, the fittest ; these survive, and evolve along the lines of degeneracy. This principle has produced, from a vertebrate type, the tunicata molluscoida, and the same element, influenced by sexual selection, has produced the degenerate parasitic male barnacle. These, however, are extreme instances. As a rule, individual structures, for the benefit of the animal as a whole, become degenerate in type, and thus enable the organism, degenerate in certain particulars, to survive as a whole, as the fittest.

Dr. Hammond has made the remark that the coming man will be hairless and toothless. But it is apparent to everyone that the people of the present age are not only losing their hair more rapidly, and at an earlier age, but the teeth also are subject to an earlier decay and degeneracy, and the eyesight and hearing are deteriorating. In my work on "Irregularities of the Teeth," and in papers read before medical and dental societies for the past eight or ten years, I have alluded to the fact that the jaws of man are undergoing a change in shape, and that the maxillary bones are diminishing in size. In my investigations for the causes of irregularities of the teeth, I have frequently observed facts to prove this assertion, but not until now have I been able to bring sufficient proof to warrant me in presenting my views to the public.

That irregularities of the teeth and jaws are becoming more numerous as each generation is ushered into the world, every physician and dentist is well aware. That there is a cause for irregularities all must admit. Irregularities of the jaws and teeth were never observed among the ancient races, nor are they found among the pure races of to-day. There are very few among the clannish European, African, and Asiatic at the present time, but irregularities of jaws and teeth are very common among the Americans and are very numerous among the nobility of European countries. The features of the early races and the features of the European, the African, and the Asiatic differ not only from those of the people of this country and from one another, but also from former generations of the same race, as it is a well-known fact that marked changes take place in the faces and expressions of the same people in one or two generations. The African of this country is a well-marked illustration of this kind.

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* Lectures on Man.

† "Degeneracy. A Study in Evolution." Humboldt Library.

One condition aiding if not producing this degeneracy is the small size of the jaw. The truth of this statement is easily verified by either observation or reading. All anthropologists unite in affirming that the jaw of animals is larger in proportion to the cranium than that of man, and the jaw of the savage races is larger than that of civilized races. "One is struck by the great backward elongation of the jaws, etc., in apes. The teeth and jaws are much larger in all their directions than in man. But the want of space in the jaw in man is only too conspicuous ; the contraction acts as if expecting the absence of the wisdom-tooth, and this having failed to occur, is, in consequence, a premature and anticipatory operation of the laws of economy of growth. The compression which the shrinking of the contracted bone exercises upon the wisdom-tooth in all stages of its existence must be very great, and possesses as potent influence in hastening its suppression as its own innate, growing defectiveness. As Dr. D. C. Hawxhurst has said, "The maxillæ of civilized races are smaller than those of savage races, which has come about through slow changes that have taken place in the environments, through the influence of which there has been a hereditary transmission of a small element of decrease to each successive descendant. The teeth have felt the influence of this changed environment fully as much as the jaws, but not in the same way. They have dwindled less than the maxillæ, and are therefore too large for the jaws and suffer from unnatural pressure. The wisdom-tooth has suffered from this disparity between the size of the teeth and jaws more than the other teeth. It is slowly becoming rudimentary. The inability of the hard parts of the teeth to correspond in size to their lessened function, or, in other words, to keep pace in retrograde evolution with the jaws and soft parts, has resulted in weakening the structure of these organs."* Mr. West has presented nearly the same views. That the increasing contraction of the jaw in the higher races is contributing largely toward the suppression of the wisdom-tooth, there is no doubt.† "Among the causes of pressure of the teeth, I would suggest the rapid intellectual development of the race" (*i.e.*, the civilized portions) causing a retrograde evolution in regard to the size of the jaws. The jaws might be shortened after the lapse of many generations by the extraction of teeth, in-and-in breeding, etc. With increase in the capacity of the brain-case there seems to be a decrease in the size of the maxillæ. The substitution of food which requires but little exercise and power of the masticatory muscles will, in a long series of generations at least, diminish the size of the jaws. This evolution of food is now going on, with regard to the race, without regard to the intellectual development of the individual.* But the cause of the degeneracy of the wisdom-tooth and maxillæ is found in their disuse. This cause has been transmitted with increasing force to succeeding generations.

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* DENTAL COSMOS, vol. xix, p. 125.

† Proc. Odont. Society of Great Britain.

Professor Schaafhausen accounts for this difference between the races by the posterior dental portion of the jaws being always shortened in those that are civilized, and this shortening may, I presume, be safely attributed to civilized mankind habitually feeding on soft, cooked food, and thus using their jaws less. I am informed by Mr. Brace that it is becoming quite a common practice in the United States to remove some of the molar teeth of children, as the jaw does not grow large enough for the perfect development of the normal number.

Darwin says it is notorious that increased use in action strengthens muscles, etc., and that disuse, on the other hand, weakens them. The flow of blood is greatly increased toward any part which is performing work, and sinks again when the part is at rest, and consequently if the work is frequent the vessels increase in size and the part is better nourished.† Disuse at that period of life when an organ is chiefly used, —and this is generally during maturity,—together with inheritance at a corresponding period of life, seems to have been the chief agent in causing organs to become rudimentary. The term disuse does not relate merely to the lessened action of muscles, but it includes a diminished flow of blood to the part or organ, from being subject to fewer alternations of pressure, or from becoming in any way less habitually active.‡ As the early progenitors of man gradually acquired the habit of using stones, clubs, and other weapons for fighting, they would have used their jaws and teeth less and less. In this case the jaws, together with the teeth, would have become reduced in size. Continued disuse weakens and diminishes all parts of the organization. Rudimentary organs are generally variable, for, being useless, they are not regulated by natural selection, and are more or less liable to reversion. We do not know through what steps under nature rudimentary organs have passed in being reduced to their present condition, but we so incessantly see in species of the same group the finest gradations between an organ in a rudimentary and in a perfect state, that we are led to believe that the passage must have been extremely gradual. As soon as the part becomes useless, another principle, that of economy of growth, will come into play, as it would be an advantage to save the development of any useless part. Mr. Roman's view is, "All parts are somewhat variable, and fluctuate in size round an average point."||

With animals living a free life and occasionally exposed to severe competition, the reduction would be greater, as it would be an ad-

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* Dr. H. S. Chase, *Mo. Dental Journal.*

† "Variation of Plants and Animals under Domestication."

‡ "Descent of Man."

|| "Variation under Domestication."

vantage to them to have the development of every superfluous part saved. With highly-fed domestic animals, on the other hand, there seems to be no economy of growth, nor any tendency to the elimination of superfluous details.

Heredity, of course, must have some influence upon the development of the jaw and teeth, although not so strong an influence as other forces. Mr. Felix Weiss concludes that the existence of the wisdom-tooth depends more upon mind-development or civilization than upon physical development or strength. The period of its appearance is later and later in life as we ascend the scale of animals; thus, in apes it appears coincidentally with the canine; in man, about the twentieth year.

Mr. Darwin lays great stress upon correlated variation; that is, variation in homologous parts. Parts that are homologous tend to vary in the same manner, for such parts are identical in form and structure during an early period in embryonic development. From the correlation that exists, at least in some cases, between the development of the extremities and of the jaws, it is possible that in those classes which do not labor much with their hands or feet the jaws would be reduced in size from this cause. That they are generally smaller in refined and civilized men than in hard-working men or savages, is certain. But with savages, as Mr. Herbert Spencer has remarked, the greater use of the jaws in chewing coarse, uncooked food would act in a direct manner on the masticatory muscles and the bones to which they are attached.*

While the authorities quoted above are not so full as might be given, yet they are sufficient to show that there is no doubt that the jaws and teeth are degenerating. Actual measurement supports this theory. The results of the use and disuse of the jaws are demonstrated daily to the dentist. Thus we observe in the mouth of a young girl from fourteen to twenty years of age, who has been reared in a hotel in any large city, very slender and delicate jaws, a vault that is usually high, and a narrow alveolar process; the teeth are small, of a bluish color, crowded together, badly decayed, with a white chalky decay; the crowns are long and small, roots long and slender and lightly set in the alveolar process; the gums are puffy, anemic, and very thin. The body of the jaw is long, the rami are short, and the angle of the jaw is obtuse; the muscles are soft and flabby. This person lives upon liquid food, pie, cake, and very little meat; she has no appetite, takes no exercise, is out late at night, sleeps most of the day, and spends the remainder in riding and making calls. She is ill most of the time, and has no color. We then observe patients whose jaws, teeth, gums, and general health vary with their occupation and position in life, until we come to the extreme in the opposite direction. This individual may be represented by the inveterate tobacco-chewer, who keeps his jaws constantly in motion; this description will also answer for a description of an individual who speaks or sings much, or who exercises his jaws by masticating his food properly. The jaws are square, thick-set; the structure is dense and hard; the body and rami are of nearly equal length; the rami are at right angles with the body; the muscles are dense and hard;

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* "Variation under Domestication."

the teeth are large, of a yellowish color ; the crowns short, roots well set in the jaw, decay is seldom found, but if present is of a black color, and arrested on account of density of tooth-structure due to the flow of blood and stimulation caused by mastication ; the alveolar process is thick, and the gum is dense and thick. This person has a good appetite, his stomach is in a healthy condition ; he has plenty of out-door exercise, and enjoys good health generally. These two descriptions serve as illustrations of typical cases of the two extremes, and can be easily seen in any dentist's office.

If anyone wishes further verification of these two cases, let him examine carefully the crania of the mound-builders or the ancient Indians, who subsisted chiefly on grains and tough or "jerked" meat ; then compare them with the civilized people of the present day, and a marked difference will be observed.

(To be continued.)

TRANSFORMISM.

BY C. N. PEIRCE, D.D.S., PHILADELPHIA, PA.

(Continued from page 92.)

In order to appreciate fully the views held by "evolutionists" or "transformists," and to realize just how they differ from the earlier and more prevalent and popular views of those whom we may term "special creationists," it is well to understand first what is meant by the term species, and also the significance of the expression, "*The origin of species.*" By the term *species* is meant the aggregate of all the individual plants or animals which have the same constant characters, these characters being different from those of similar forms, and reproducing themselves in such manner that each individual shall resemble the parent, their peculiarities being permanent and such as to distinguish them from other animals. The special creationists contend that these groups of particular or parent forms were the result or product of a special creative act, or to use the words of Linnæus, who says, "We reckon just as many species as there were forms created at the beginning." And this was the generally accepted view. · But Buffon rejected this and asserted his belief in the modificability of species. This view was soon afterward elaborated and greatly strengthened by Lamarck, who believed that species were the natural result of a succession of pre-existing forms, but dissimilar from any then existing, by the disappearance of the intermediate ones, making a more or less wide chasm between the various varieties themselves as well as between them and the primitive forms. The disappearance of the connecting link between the ancestral and derived forms is of frequent occurrence, so that species of the same genus, as above stated, are completely separated from each other. The same relationship, but in a greater degree, therefore exists between the various species of one genus as between different varieties of the same primitive forms.

To illustrate we cannot do better than by taking a paragraph from "Darwinism," by Wallace. He says, "We will take two common English birds, the rook (*Corvus frugilegus*) and the crow (*Corvus* *corone*). These are distinct *species*, because, in the first place, they always differ from each other in certain slight peculiarities of structure, form, and habits, and in the second place, because rooks always produce rooks, and crows produce crows, and they do not interbreed. It was therefore originally concluded that all rooks in the world had descended from a single pair of rooks, and the crows in like manner from a single pair of crows;'' but the origin of the first pair of each kind was a mystery, save by a special creative act. But this theory was still more mystified when the fact was recognized that in different parts of the world there were thirty other kinds of birds so much like these species that they received the common name of crows, and yet differing so much from one another that they also must, in accordance with the previous theory, have each descended from one pair of ancestral crows of an unknown origin, save it be of supernatural agency. In the same way many animal as well as plant forms may be instanced, where the varieties extend into the hundreds with such distinct peculiarities and habits that each must be traced to a single ancestor or pair of ancestors in order to conform to the theory of supernatural agency. It was this complication, increased by the fact that very slight differences only between many of the species existed, and that numerous connecting links between very different forms of animals and plants had been observed, that led naturalists to conceive the idea that they might all have been produced one from the other and having a common ancestor.

If *species* were the result of a ''special creation,'' then there could be no question as to the origin of families, orders, and classes, because in this first step of all the ''origin of species'' would necessarily put the others by any other origin entirely out of the question.

This is now all changed. The scientific as well as the literary world accepts as a matter of fact, and as '' common knowledge, the origin of species from other allied species by the ordinary method or process of natural birth.''

But with this acceptance arises the inquiry as to the factors which have been instrumental in bringing about this wonderful result, whether many or few, and from what primitive form or kind of living being. Assuming the existence of this primitive form, science is to-day prepared to explain the subsequent production of all others, with their various degrees of complexity, culminating in man and his contemporaries from the most remote period, through unlimited time and successive ages down to the present. That it is all in accordance with the general law of ''evolution,'' or ''transformism,'' is now the accepted hypothesis, and that this, like the law of gravitation, applies to everything. As the planetary system appears to have been evolved from an ancestral nebulæ, so all existing forms of life, vegetable and animal, seem to be evolved from some primordial germ, with a continual succession of changes, the more complex and higher forms being the slowly modified descendants of less complex beings, while these were the modified descendants of still less complex forms, and so on until we go back to the earliest and simplest plants and animals. And this is all the result of processes which we daily observe in operation around us, by the adaptation to environing conditions, and the hereditary transmission of acquired individual peculiarities.

We see in a single microscopic cell the potentiality of every form of living being, needing only time and space to realize its possibilities. "Surely, then, if a single, simple organic cell shall, in the course of a few days, months, or years, result in the production of a moss, an oak, a worm, a fish, or a man, there certainly can be no improbability that a like cell, in the course of untold ages, may have been the ancestor of all existing forms of living beings." (Leidy.)

These views are strengthened and sustained by the following recognized and undisputed facts :

1. In the production of every individual being the number of germs that perish far, very far, outnumber those that come to maturity,—those best adapted surviving.

2. "Influence of physical environment,"—heat and cold, dryness and moisture ; these affecting function of organs, and function affecting structure, with both changed function and structure inherited by offspring.

3. "Use and disuse of organs," enforced by changed environment,—struggle for food, sexual selection, or self-protection. This may result in change of form, size, and structure of the organs, these changes being inherited by offspring and from generation to generation integrated to an almost unlimited degree.

4. "Tendency to variation, or variability of all beings, which may be emphasized by the statement that "nothing is stable but instability," this factor being one of the most important, if not the most important, involved in the hypothesis of "transformism."

5. "Natural selection, or survival of the fittest." In this factor the form and structure are supposed to remain unchanged during the individual life, but in the offspring variations occur in different directions. "When we remember that by reproduction the number of individuals tends to increase by geometrical progression, and that in each generation only a very few can survive, it is evident that among these divergent varieties those will most likely survive which are most in harmony with the external environment, and therefore most readily obtain food or means of living." (Le Conte.)

6. "Struggle for existence," in which those possessing in the greatest degree strength, adaptability, organs of defense and offense, ability to escape from an enemy or for acquiring and appropriating food, will have the advantage, and in turn will transmit this advantage to some of their progeny in a greater or less degree. It matters not how small or slight the change if in the line of adaptation to environment, it will from generation to generation be integrated and in time result in an almost unlimited modification or transformation.

7. "Sexual selection." "In this there is a struggle among the males for the possession of the female, and the means of procreation." "This mode of selection acts in two ways, by the law of battle and the law of attractiveness." The strongest and most attractive males are the ones leaving the greatest number of offspring inheriting the peculiarities of the parent, which are accumulated through successive generations, thus increasing in the progeny strength or beauty. Of these several factors which have been individually enumerated, they all have their power of transformation greatly enhanced by the fact which has already been recognized, *i.e.*, multiplicity of germs and constant tendency to divergence or variation, with those in harmony with external environment most likely to survive.

In this struggle for existence which we recognize is going on unceasingly between all organized beings, and more especially between those most resembling one another and having similar desires and necessities, and which it is claimed has such a potent influence in the modification of plants and animals, it must be borne in mind, as previously expressed, that all organisms, plants as well as animals, are continually, in response to a universal law, varying to a greater or less extent, and that this variation alone affects all their organs and characteristics, though usually in a single generation, to an imperceptible or an unobserved extent. But while this is the case, it must also be remembered that the struggle to which all are subjected is an unceasing, perpetual one, in which the slightest variation in a certain direction may prove of the utmost importance for protection and perpetuation. In illustration, let us take the struggle which any ordinary plant carries on, and note the advantage which this power or capacity for variation gives it regarding climate and soil. If the latter is impoverished, and in consequence thereof is unable to afford nourishment to the full colony or group which have germinated thereon, they do not all perish at once. Those least adapted go first, while the ones that can longer withstand the absence of nourishment survive. Or the opposite condition may prevail, and a superabundance of food may stimulate to vigorous growth. The plant with greatest power of assimilation will overshadow and crowd out the less fortunate. There may also be an excess or absence of moisture, with the same results. Those depending most upon moisture will die first, while those able to resist the condition would survive to propagate their kind. The climate also must have its influence. Plants unable to withstand the extremes of heat and cold will succumb, while those whose variations give them the resisting power will survive. In this way we have plants unaffected by either frosts or a tropical sun. These properties, manifested in a slight degree at first, increase in the course of succeeding generations, so that a form which could at first only bear or survive a temperate climate gradually produces varieties which are enabled to endure a more and more severe temperature until the limit of organic structure is reached. From these comparatively simple deviations, greater and greater diversity may result, until we may have widely diverging forms which may claim descent from a common ancestor. But in this plant struggle for existence, climate and soil are not the only modifying influences: these are complicated again by the encroachment of other plants and the attacks of animals. Here again this power of variation may serve it a most admirable purpose, either by taking advantage of its neighbors for self-protection, or by some exudation or habit which will be disagreeable to its too near rival for food and sunlight. With plants which are similar, having the same needs and living socially, only the most vigorous arrive at full maturity, the weaker ones being smothered; on the other hand, where they differ greatly from one another they can thrive side by side, because their demands or requirements are different and there is necessarily less competition.

The continued warfare which goes on between species and races, much like that between tradesmen, manufacturers, etc., is very obviously most severe between those most nearly related, because they require so nearly the same conditions for existence. But notwithstanding this, every gardener knows that if the weeds are allowed to grow unchecked, they will soon smother his flowers and vegetables, and if left in full control will soon cover the ground with two or three different kinds, and these in their struggle for supremacy may in a few years be entirely supplanted by another variety or, indeed, species. Agassiz, in his work on Lake Superior, states that the roadside weeds of the Northeastern United States, to the number of one hundred and thirty species, are all European, the native weeds having disappeared westward. We get a little idea of the power or determination of weeds when we realize how easily they can smother and drive out cultivated plants, and the amount of labor necessarily bestowed by the gardener in his effort and desire to protect and maintain the product of his soil. The struggle must go on, one being or organism with another, or else with the elements and physical conditions of life, or the natural increase at so high a rate would soon cover the earth with the progeny of a single pair.

Linnæus calculated that if an annual plant produced only two seeds, and their seedlings the next year produced two, and so on, in twenty years there would be a million plants. Darwin estimated that if the elephant, which is the slowest breeder of all known animals, should begin at thirty years, which it is assumed is the age, and go on breeding until ninety years old, bringing forth six young in the interval, and surviving until one hundred years old, after a period of from seven hundred and forty to seven hundred and fifty years there would be nearly nineteen million elephants alive, descended from the first pair. But evidence nearer home than this have we in the natural increase of the English sparrow, and that notwithstanding the warfare against it.

Darwin, on page 53, "Origin of Species," says, "The causes which check the natural tendency of each species to increase are most obscure. Look at the most vigorous species: by as much as it swarms in numbers, by so much will it tend to increase still further. We know not exactly what the checks are even in a single instance. . . . Eggs, or very young animals, seem generally to suffer most, but this is not invariably the case. With plants there is a vast destruction of seeds, but from some observations which I have made, it appears that the seedlings suffer most from germinating in ground already thickly stocked with other plants. Seedlings, also, are destroyed in vast numbers by various enemies; for instance, on a piece of ground three feet long and two wide, dug and cleared, and where there could be no choking from other plants, I marked all the seedlings of our native weeds as they came up, and out of three hundred and fifty-seven no less than two hundred and ninety-five were destroyed, chiefly by slugs and insects. If turf which has long been mown, or closely browsed by quadrupeds, be let to grow, the more vigorous plants gradually kill the less vigorous, though fully-grown plants; thus out of twenty species growing on a little plot of mown turf (three feet by four) nine species perished, from the other species being allowed to grow up freely."

Mr. Wallace (page 24, "Darwinism") relates a very forcible example of the effect of this struggle between plants, communicated to him by a resident in New Zealand, Mr. John Ennis. "The English water-cress grows so luxuriantly in that country as to completely choke up the rivers, sometimes leading to disastrous floods, and necessitating great outlay to keep the stream open. But a natural remedy has now been found in planting willows on the banks. The roots of these trees penetrate the bed of the stream in every direction, and the water-cress, unable to obtain the requisite amount of nourishment, gradually disappears."

Recurring again to the tendency to variation, which is a no less important factor, we find that divergences which are numerous, though slight, give naturalists much trouble in classification, though they are of the utmost importance in connecting divergent groups, and a collection without its illustrative specimens of the varieties occurring in the several species would be greatly depreciated by their absence. Nor is this variability confined to domesticated animals or cultivated plants; these beings, in the wilds of nature, are not less subject to the same peculiarity. Neither is it restricted to the simplicity or complexity, the homogeneity or heterogeneity of structures. The little masses of living jelly, apparently structureless, and among the lowest and most ancient of marine organisms, are the Foraminifera. These constitute a very curious and remarkable group, important from the immense numbers in which they occur in a fossil state, and interesting from the peculiarities of structure whereby they are distinguished. Plancus counted six thousand in a single ounce of sand from the Adriatic shores, and D'Orbigny estimated that an ounce of sand from the Antilles contained not less than three million eight hundred thousand. The late Dr. W. B. Carpenter, in his work, the "Introduction to the Study of the Foraminifera," thus refers to their variability: "The range of variation is so great among the Foraminifera as to include not merely those differential characters which have been usually accounted *specific*, but also those upon which the greater part of the genera have been founded, and even in some instances those of its orders. Edward Potts, of Chester county, Pa., in his monograph on fresh-water sponges, says, "Were all the names that have been dropped or marked as varieties to be recognized as full species, on the ground that the specimens so designated do not exactly resemble any others, the literature would be encumbered with a mass of names representing forms that no description could distinguish, and no one of which would probably entirely correspond with the next specimen collected by its author from the same stream."

Conchologists in writing on the Mollusca describe an almost unlimited variety. Thus the late George W. Tryon, Jr., in speaking of his undertaking, said that nearly forty thousand illustrations would be required to thoroughly represent this department of science, while a French author has enumerated not less than one hundred and ninety-eight varieties of the common wood-snail (*Helix hemoralis*), and ninety varieties of the common garden-snail (*Helix hortensis*). The readers of the DENTAL COSMOS are all familiar with not only the great variety of *insects*, but also their variability. This being, in its mature, or perfect state, is readily recognized by its division into three principal portions, the *head*, the *thorax*, and the *abdomen*, but before arriving at that perfect condition in which the above-mentioned characters are conspicuous, the larger proportion of them undergo a series of changes, both in their outward form and internal structure, which constitute what is generally termed their *metamorphosis*.

In this metamorphosis they vary very much, though some insects do not exhibit this phenomenon, but keep through life much the same form as when escaping from the egg. In this genus the power of mimicry possessed by some species is most remarkable, and of great advantage in the preservation of the kind. It is a fact well established that some varieties possess an offensive odor and taste, which protects them almost wholly from attacks of insectivorous birds or other enemies; in the variation of groups not having this protection, those which would most nearly resemble in color and external appearance the protected species would have the advantage gained by this resemblance, and hence be spared to reproduce a progeny a larger proportion of which, in each succeeding generation, would be like the parent ; in this way edible groups come to resemble in color, etc., the distasteful ones. If by this change the food-supply of insectivorous birds should become seriously diminished, they in turn would be forced to seek other food, or else to modify their tastes to correspond, so that they should finally eat with a relish what they first consumed only under the pressure of hunger. The variability of fishes and of birds, though probably less than that of insects, is yet sufficient to be of interest to the naturalist and of protection to the variety or species. The variability occurring among poultry and pigeons, as well as dogs, sheep, and other animals, whether domesticated or in a wild state, is too well attested to be worthy of doubt. The satisfaction to be gained from this array of divergence in favor of transformism is simply that in this universal tendency to variation, those forms which are best adapted to environment are the ones which will survive and multiply.

(To be continued.)

THE EVOLUTION OF DISEASE.

BY DR. BAYARD HOLMES, CHICAGO, ILL.

(Read before the Chicago Dental Club, February 22, 1892.)

MR. CHAIRMAN AND MEMBERS OF THE CHICAGO DENTAL CLUB : I will try to make my remarks as brief and, at the same time, as comprehensive as possible, and endeavor to give you an idea which I have wrought over in my own mind a great deal. I believe it has had a distinct influence upon my study and upon my treatment of disease, and a decided influence upon my idea of what is to be done regarding it.

It is said that a celebrated inventor put to work hundreds of boys to make combinations of materials taken at random in order that he might find some new material to use in some of his electrical appliances. Now, that is a very peculiar way to pursue such a research. The scientific investigator to-day does not use such a method. He takes what data he can secure, and studies all the possible schemes by which he can connect the points in those data. Then he says the truth may be such and such a curve with such and such a formula. In other words, he forms a hypothesis, and having done that, he begins to work upon it until he proves that within certain limits it is correct or incorrect. If correct, he acts upon it as a theory, and having proven its truth as a theory he at last frees it from its surrounding unknown factors, and it then becomes a law.

It seems to me that we may start upon the evolution of disease as a hypothesis. It may later become a theory, and we may trim it and trim it until we have formulated a law.

Man is heir to two distinct kinds of diseases. A child may have an extra finger, a cleft palate, or some other congenital histological malformation, which interferes with health. A hereditary defect may affect only a certain portion of the nervous system : thus, we have the peculiar disease which we call hereditary ataxia. This disease begins at a definite period of life, and terminates fatally in a certain, practically definite time. All such diseases are due to hereditary defects, to something wrong from the beginning, or to the perversion of a tendency which was intended to do something right. When the arm budded off from the body there was a tendency in that single cell to divide so as to make five fingers, but we have six fingers. This is a disease in one sense. The spinal cord should divide itself off into a certain number of branches. If it divides itself into less than a certain number, there is some defect or disease. The same is true of the brain and other parts of the body. These diseases are subject to the laws of evolution, or the transmission of them from generation to generation is subject to certain rules and laws which are easily and plainly formulated by evolutionists and embryologists. I do not propose to consider these diseases, due to internal errors, in this lecture ; I shall simply speak of the evolution of extrinsic diseases. These diseases come from without, and I shall speak only of those that are due to the action of living organisms upon us. One disease that you are acquainted with as being due to an organism coming from without is an affection which has been termed the itch. The itch is due to a small organism, we can hardly say micro-organism. It lives in the follicles of the skin. It produces an unhealthy and uncomfortable condition of the human body. I only wish to speak of this to call your attention to the fact that looking at this little organism and studying its history and possibilities of life, we may say definitely and truly that men have had the itch more than ten thousand years. Why? How can we say that men have had the itch so long as that? From the simple fact that the itch insect is unable to live under any circumstances whatever except upon the body of man. It is not able to live upon a dung-hill, upon filth or garbage thrown out at the back-door. An organism so complex as the itch insect does not vary rapidly. That is, the offspring of an old itch insect inherits such a bodily structure that it cannot live very well on the garbage-box or any filthy substance. It must have the warmth and nutrition of the human body. The structure and functions of these structures have become modified so that a parasitic existence is necessary. We call this condition obligate parasiticism. The parasite is obliged to be a parasite, and in order to have become an obligate parasite it must have been for a very long time a parasite of man, inasmuch as it has so changed its structure that it varies slowly and can only live a parasite. It may be that when we were living in the trees the itch insect was living on the leaves of the trees. It is possible that at that time it began occasionally to live upon man and started off from the parent plant-itch, and at last became the degenerate itch of human beings. It must have been a very long time ago that such a little animal began to take up its abode with man, that it has got so now that it cannot live under any other circumstance. I speak of this to illustrate what is meant by obligate parasiticism. There are parasites that are not obligate. Supposing you should go into a pond on a hot summer day to swim; you might come out with a blood-sucker on your leg. That blood-sucker takes the blood out of your body and gets very full, and enjoys its meal, but it can get along without you. It can live on the filth in the pond. It does not need to have any of your blood in order to live, but it is easier for it to get a meal in that way. This illustrates the condition of the facultative parasite. Between these two conditions, the one entire dependence, the other perfect independence, there are numerous gradations. These grades represent not only various degrees, but also, other things being equal, various durations of parasitism. Of the parasitic diseases, let me speak only of a few with which you are most familiar.

I shall speak of three chronic infectious diseases. Leprosy is produced by a micro-organism, long, thin, evidently a bacillus. It stains with difficulty, and does not give up its stain readily to acids. The bacillus is composed of two kinds of protoplasm; one stains, the other does not stain. It is a lifelong parasite of man. The bacillus of leprosy cannot grow upon any artificial culture-media. This means that leprosy is an old parasitic disease of man. The bacillus cannot be inoculated into the dog, the rabbit, the guinea-pig, the monkey, or the tailless apes. The only creature afflicted with this disease is man. It is therefore an ancient disease of man.

Syphilis is due to a micro-organism, a little smaller than the bacillus of leprosy, which we may plant upon blood-serum, on gelatin, on the nicest dishes we can make up for it, and it will not grow. It will only grow upon tailless apes. Klebs has succeeded in inoculating these animals with syphilis.

Tuberculosis is due to a parasite, the bacillus of tuberculosis, which resembles leprosy and syphilis in its staining reaction, in being composed of two kinds of protoplasm, and in being closely parasitic. However, it grows upon blood-serum, after being kept for some weeks at the temperature of the mammalian body. This parasite readily attacks the domestic animals.

A boa constrictor in the Zoological Gardens in Philadelphia sickened and died after a number of years of confinement. When the post-mortem was made, it was found that it had died of tuberculosis. The bacillus of tuberculosis is a parasite of the warm-blooded animals, and even of some of the reptiles. It is not so ancient a parasite of man as leprosy and syphilis.

Suppose a man has a parasitic disease and it kills him, what becomes of the parasite? The parasite dies when the man dies, and that ends the matter. It is not possible for us to conceive of a destructive obligate parasitic disease which is confined to a single species. Supposing leprosy killed everybody that got it, it would soon die out, because it lives only on living men. We cannot conceive of a very destructive and absolutely obligate parasitic disease, therefore the more destructive the disease the less closely parasitic it is. Leprosy is a close parasitic disease; it does not kill as many people as tuberculosis. Tuberculosis is not a close parasitic disease, and is a much more destructive one.

The acute infectious diseases are those which a man gets only from another man suffering from the same disease. He gets one of them, and then gets over it. He does not get it again. There is smallpox, for instance; you have it, you can't have it again. There are scarlet fever, measles, whooping-cough, and mumps; you may have them once, but you cannot have them again, except you may have the last affection in some other place.

These diseases run a typical septicæmic course, and are believed from analogy and clinical history to be due to a *contagium vivum.* Not a single one of the parasites has been demonstrated. We know it only by inference. The reason we cannot prove it is because we cannot grow microbes that are absolutely obligate parasites. There is something peculiar about these diseases. The more destructive they are, the less contagious, the more complete the immunity. Measles rarely kills one, yet it is very easy to get. Scarlet fever and smallpox are much more destructive, but they are much less contagious. The micro-organisms of these diseases cannot be raised in our garbage-boxes or in the Chicago river.

With the infectious filth-diseases the case is quite different. Their germs are not closely parasitic. They can get along just as well without us. If man were to go away from Chicago and be gone one hundred and fifty years, leaving the city a desolation and a waste, on his return he might get typhoid fever, because the typhoid germs will live and reproduce themselves for one hundred and fifty years in the Chicago river without having its filth reinforced during the whole time. Typhoid fever, diphtheria, cholera, yellow fever, malaria, and pneumonia are due to micro-organisms, which we can, with the exception of malaria, cultivate. We can produce diseases analogous to these affections in animals. All of these diseases have a fairly typical course, and are not followed by immunity. If you get over typhoid fever once, you cannot have it again. The same is true of diphtheria. If you have cholera one year you may have it again next year. It does not afford any protection. There is one peculiar thing about the germs of these diseases, and that is this: they will live in the garbage-box and in the sewer-pipes. When we become more civilized we will not have any of these diseases. The typhoid germ lives in ordinary filthy wells. If one goes to a farm, has typhoid fever, and the stools are emptied in the outhouse, they percolate down into the well and continue to do so for years and years, because there is plenty of nutrient material in the outhouse to keep the germ actively reproducing itself. It will thus keep the well supplied with typhoid for half a century to come.

We do not know where the germ of diphtheria comes from. We do not know where it lives when at home. We are ignorant in regard to this matter. We have not a physician or scientist in the country that can tell us how to find where the germ lives when at home, nor how to cause the extermination of diphtheria when a patient has died, and the safety of the survivors is sought.

Again, we do not know where the germ of pneumonia lives. It is a filth-disease. We can cultivate germs of pneumonia on beef-tea, agar, and other substances, and they will live in an ordinary temperature of a room. Let us pass malaria, cholera, and yellow fever.

The infectious wound-diseases are the accidental and necessary diseases of man. My studies of the evolution of disease do not lead me to think that we can cure them without the surgeon and dentist. They are the pus-diseases, tetanus, malignant œdema, and hemorrhagic septicæmia. There are a number of others. In order that a pus-parasite may get into the body, there must be some defect in the skin or limiting membrane. Our skin is always covered with pus-microbes. Wash your hands,—and I urge you by all means to do it with lemon-water, as has been recommended,—you cannot possibly get rid of the pus-microbes on the finger-ends. These pus-microbes are unable to get into the body to produce disturbance there, because man has had them about him so long that he has surrounded himself with a hard skin and mucous membrane which is a protection against them. When the skin or mucous membrane have been torn off or injured by traumatism, the microbes may enter the body. So far as I know, all the diseases of the teeth are due to pus-microbe or saprophytic infection. Tetanus, malignant œdema, and hemorrhagic septicæmia are due to micro-organisms which we can cultivate on any material, and hence are not close parasites of man. They must have an *atrium* made for them before they can get into the body; and for the treatment of these diseases we can expect nothing except the care and skill of the surgeon or of the dentist.

Notice that the chronic infectious diseases, leprosy, syphilis, and tuberculosis, affected our grandfathers a long way back. It was a common thing in the days of Queen Elizabeth, and even later, for some families to have the itch nearly every winter. How did this parasitic disease disappear? It was exterminated by cleanliness. The knowledge of the ultimate cause of itch made it a disgrace to have the disease. In olden times people did not think about cleanliness as we do now. Tuberculosis, syphilis, and leprosy are diseases we do not need to have. Some time in the future, when we are more civilized, we shall be as much ashamed to say, "My daughter has died of consumption," as "My boy is just getting over the itch." I believe it will be a disgrace to any neighborhood and to any family to have tuberculosis. Tuberculous patients will be isolated from civilized persons. They will not be allowed to spit on the floor, or to spit tubercle-bacilli on their handkerchiefs and flash them into our faces. Tuberculous cooks will no longer be employed in our kitchens. We will no longer buy articles in the bake-shop where girls engaged in packing crackers are coughing with tuberculosis of the lungs.

Syphilis I do not need to tell you about. It is nearly always contracted in the good old-fashioned way. Sometimes dentists infect their patients with unclean instruments; at least they have it laid to them quite often. Maybe they deserve it occasionally. Syphilis is easily acquired, and when acquired it is not easy to get rid of. It is a rather fortunate—or unfortunate shall I say—fact that we have found an antidote for that disease in mercury and iodine. I do not know but that we would be better off if such a discovery had not been made, because, like cologne, it covers up a multitude of sins. People ought to have syphilis so bad that everybody would know it. It is in a sense unfortunate that mercury and iodine have such curative effect upon this disease. The chronic infectious diseases will every one of them be exterminated by education and intelligence.

For the acute infectious diseases, smallpox, scarlet fever, whooping-cough, and measles, we have a remedy for only one, smallpox. In former times one in fourteen of all deaths was due to this disease. Now, less than one in thirty thousand. Smallpox has been almost exterminated by the preventive vaccination of Jenner. Every physician and bacteriologist believes that scarlet fever, whooping-cough, mumps, and measles will be robbed of their terror for parents by some such method of preventive inoculation. In regard to whooping-cough, measles, and mumps the same thing may be said. Each one of these diseases ought to be obliterated or driven out of the world by protective inoculation. If there was offered an adequate reward, I believe the thing could be accomplished within ten years.

In regard to typhoid fever, pneumonia, diphtheria, yellow fever, cholera, and malaria. We have an antidote for malaria, in quinine. Quinine seems to terminate malaria. For the rest of them we have no medicinal remedies whatever. We give our patients placebos, and let them get well or die. In regard to pneumonia or diphtheria, something has been done. Bacteriologists have produced typhoid fever, diphtheria, and pneumonia. They have cultivated the germs of these diseases upon artificial media, and then filtered out the microbes with a Pasteur filter. These chemical substances are of two kinds. The first kind produces all the symptoms of the disease, the second kind terminates the growth of the parasite. For example, in diphtheria, two rabbits are inoculated. The first rabbit is injected with a portion of the anti-diphtheria ptomaine. What happens? This rabbit runs off and eats cabbage; the other dies. It is the same way with pneumonia. We can inoculate pneumonia into rabbits, and they will all come down with the disease. The pulse beats faster and the temperature runs up. Pneumonia in the rabbit is not an immediately fatal disease. The animal lives for a certain length of time and then dies. If we inject a whole series of rabbits with anti-pneumotoxin, they all get well. Pneumonia can be terminated immediately. With typhoid we have not succeeded quite so well. We are able to arrest this disease, but are not quite so successful with it as with others.

There is one other disease, tetanus, in which we can bring about a termination by the injection of the anti-tetanus-toxine. If we inoculate animals with the tetanus bacilli, they invariably die of lock-jaw; but if we inject them with the anti-tetanus ptomaine every one of them recovers. This is the most successful one of all, so far as I know. It has been successfully used in man.

The pus-diseases never show any tendency whatever to stop. They go on until drained out, and mechanically come to an end. An old tooth will be rotting and decaying for years until it finally drops out of the head. Bones will suppurate and decay for twenty years. We cannot hope to exterminate these diseases by injections. We cannot hope to prevent suppuration of a tooth. I can conceive of no sort of treatment which would prevent having a pus-disease. I do not see any way in which we can get rid of the surgeon or of the dentist. We must have them with us always.

We ought to pay liberally for the diffusion of knowledge. We must not give to relieve distress, but to prevent it. The money that is spent for charity should be spent in education. A reward should be offered for the prevention of each of the acute infectious diseases. Every one of them can be eradicated by some sort of preventive inoculation. The infectious filth-diseases will be robbed of their victims by communal intelligence and terminating injections. We are getting them very nearly cornered.

The next class of diseases are those that are due to pus-microbes and such other organisms as gain entrance into the body., They are to be taken care of by the surgeon. When we get these diseases, we render their course as short as possible by the application of such antiseptics as will destroy them *in loco.*

METHODS OF FILLING TEETH.*

BY RODRIGUES OTTOLENGUI, M.D.S., NEW YORK, N. Y.

(Continued from page 201.)

THE RELATIVE VALUES OF CONTOUR AND FLAT OR FLUSH FILLINGS.

To imitate nature should be the aim of every true artist. Yet the landscape-painter, who contents himself with copying what he sees spread out before his view, would frequently produce a picture which lacked composition. In dentistry the skilled workman is he who has the eye to see contour, the trained fingers to reproduce it, and the *judgment to decide when and where it should not be attempted.*

The reproduction of the original form of a tooth, which has been partly destroyed by caries, must be undertaken in over ninety per cent. of the cases presenting. This being my opinion, and being one contrary to the teaching and the practice of some men of eminence, I shall state some of the reasons for my conviction.

It will scarcely be disputed that the whole scheme of the universe is a perfect plan. No improvement upon it is possible. The construction of every creature is accurately adapted to his intended mode of life. Yet it has been claimed by some that the formation and structure of the teeth of man are less perfect than those of the lower animals, since man is the only animal who constantly suffers from caries. This disease has been found in other animals, but it cannot be said of any other species that we can take any individual at random, and be almost sure to discover the ravages of caries, as we do in man. Consequently we must admit that the human race is more susceptible to it. That this is due to the formation of the teeth themselves, or to their arrangement in the jaws, however, cannot be claimed, because the chimpanzee, the gorilla, and other members of the ape family have jaws practically similar to that of man, and yet caries is so rare with them that a jaw with the teeth showing it is a curiosity to be preserved and placed in the glass case of a museum.

The probability is that man suffers because he cooks his food, for we find that where we take animals unaccustomed to such diet, and domesticate them, feeding them upon our style of food, they frequently suffer from caries. The question then arises, Shall we alter the shape of a tooth which has been attacked? Shall we depart from the standard set up by Nature, because of the fact that we do not eat the kind of food for which we were designed? If we examine the dog, we discover that with his pointed teeth, although he eats from our table, he suffers very rarely from caries. Shall we decide from this that we may file the human tooth into an approximation of a cone,

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producing such spacing that the tip of the tongue may remove the refuse food from between the teeth? This is a serious question, especially as the production of this V-shaped spacing was once strongly advocated, and largely practiced. It is indeed the custom of some dentists to-day, and it may come up again within a few years, just as many other discarded practices have been rediscovered, and taught and adopted, till their mischievous results once more condemned them to oblivion.

The V-shaped space will succeed in the human mouth, only when the gum of the human individual approximates in density that which we find in the mouth of the dog. In man the teeth occlude squarely, the one against the other. We grind our food between enamel-surfaces. With the dog, except in the incisive region, the teeth pass between one another, and *bite against the gum itself.* This gum-tissue is comparatively thin, and supported below by a dense alveolus. Such a thing as an inflammation, or hypertrophy, in this region is unknown. I have seen pyorrhea alveolaris in the mouth of a dog, but that was in the incisive region. How is it with man? The gum-tissue is arranged in a very different manner. We find between all the teeth a pedicle extending toward the incisive edges. *This pedicle is the thickest part of the soft tissue, and therefore least able to withstand irritation from pressure.* Any attempt to chew upon it will result in disease. In the normal mouth it is protected by the approximation of the adjacent teeth, which by touching each other are expected to prevent food from passing between the teeth, and impinging upon the gingiva. I argue therefore that we cannot allow ourselves to copy the dog, because while we may give man the dog-shaped tooth, *we cannot assure him a resistant gum-tissue between the teeth, which will withstand the crowding of food against it*, as occurs with the lower animal.

In conditions of disease where pyorrhea alveolaris has been present, we have been taught, and well taught, that until we can produce rigidity of the teeth, we cannot hope to see the disease cured or even temporarily controlled. Why is this? Because as long as the teeth are readily movable, the soft tissue will be in a constant condition of irritation due to such motion. If this be, and it is true, should we not pause before producing or leaving spaces between teeth? As soon as a space is made, do we not destroy the integrity of the abutments in the arch, and so make mobility of all the teeth more possible than before? This is especially true of the two teeth on either side of the space. Whenever food is chewed in that region, it is packed between the slanting planes, and acts as a wedge to drive the teeth apart. Not infrequently this results in a loosening of the two teeth, accompanied coincidently by an inflammation of the gingiva. This inflammation goes on till a suppurative stage presents; then there may occur hypertrophy, and often pyorrhea directly results. I have noted mouths where several teeth were affected with this dreadful disease, and then have found that the teeth most involved were two between which the V-shaped space had been made. I have no hesitation in saying that in these cases the pyorrhea was first caused as I have specified, and that subsequently the neighboring teeth suffered by infection. Thus the dentist who filled the space invited, and I may say induced, pyorrhea. Of course these are extreme cases, and there are instances where the V space has been entirely successful; but in all cases that have come under my observation, and they have been very few, I have noted that the gum-tissue was dense and tightly drawn over the alveolus, the pedicles between the teeth being of a cartilaginous firmness, short, and tough.

In brief, my chief reason for advocating contour fillings, aside from any consideration of cosmetic effects, is that to leave a space, or to form one, between two teeth, is liable to result in a loosening of the teeth, or a diseased condition of the gingiva. In the latter case, caries will almost certainly reappear along the gingival margin of the cavity, and undermine the filling.

The production, then, of a perfect contour, is the most important element in the successful filling of teeth. A novice may soon be taught to stop a small cavity which is surrounded by strong walls. To insert a contour filling, of such a form that beauty, usefulness, and strength shall each be attained in the highest relation to the conditions presenting, requires a skillful manipulation, a knowledge of tooth-form, and a mature judgment, which only experience can give. I can only hope to direct attention in the proper channel. No theorizing can give the student such attainment.

FIG. 65.

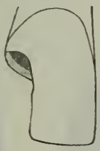


FIG. 66.

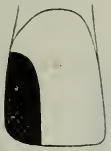
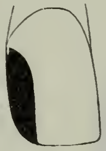


FIG. 67.



In every case which presents, the question will arise, Can the original form be reproduced, without danger of future failure? This requires often a keen knowledge of the mechanical arrangement of the cavity for the retention of the filling, of the probable strength of the special tooth under consideration, of the force of leverage which under mastication the filling will exert upon its anchorage, and of the amount of usage which the particular patient will give to it. There are men who chew with such energy that they not only wear out their teeth early by abrasion, but the best gold filling will become roughened rapidly in their mouths. In such cases it would be folly to attempt an extensive contour with doubtful anchorage; whereas in the jaw of a refined and delicate woman, the experiment might be made with much safety.

The lateral incisor of the superior jaw offers the greatest problem in contour, but fortunately it is a tooth so variable in shape that we may be enabled in almost any case to so fashion the filling that it will be durable and at the same time sightly; that is, if compelled, we may produce a contour which is of good form, though not similar to the original structure.

Fig. 65 shows a lateral incisor with a cavity which is often puzzling. Where the pulp has been removed, we may obtain such good anchorage in the upper part of the cavity, packing the gold well into the canal if need be, that we would have no hesitation in producing a full contour as seen in Fig. 66. But suppose that the pulp be alive, and despite the ravages of caries sufficiently well covered by dentine to render its salvation assured? It would be most reprehensible to devitalize it.

Yet to attempt to obtain an anchorage which would retain such a contour as shown in Fig. 66 would in most cases be impossible, and even where attained, we would be likely to approach the pulp so closely at some point that it would be liable to die subsequently. I will give a case of this character from practice, which will be instructive. But first let me dispose of this lateral incisor with its living pulp. We may fill the tooth, preserve the life of the pulp, and produce a presentable and durable contour, by resorting to a screw, and shaping as shown in Fig. 67. The distal corner of the lateral incisor is often a fairly sharp angle, but it is more often a curve, and sometimes as much curved as shown in the last figure. If Figs. 66 and 67 be compared, it will be seen that in the former the length of the gold along the incisive edge produces a strong leverage, which during mastication would operate to force the filling out of the cavity. Where the anchorage therefore is slight, it will be safer to adopt the second form, or as much of an approximation to it as judgment shall direct, for the leverage is almost annihilated by the curved line, while we still retain a semblance of tooth-form. Where the tooth of the opposite side is so markedly different as to make too decided a contrast, there might be no harm in slightly altering it so as to produce harmony.

FIG. 68.

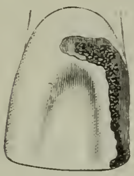


FIG. 69.

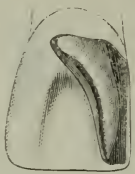


FIG. 70.

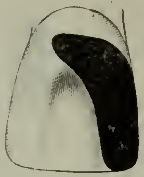
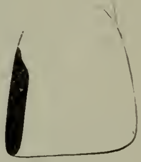


FIG. 71.



To come to the case from practice alluded to. The patient was a married woman about twenty-five years of age, and decidedly anemic. She was excessively nervous, and her teeth hypersensitive. The history given to me was that the two teeth which she wished me to fill had already been filled seven times, each time with gold, and all had failed. They were a central and a lateral incisor. The first examination showed two crumbling gold fillings, of very poor shape and leaking badly. They were readily tipped out with an excavator, and the cavities were most uninviting. The central incisor seemed to be the more difficult, and therefore was undertaken first. Fig. 68 gives the condition of the tooth seen from the palatal aspect, where the loss of tissue was most apparent. After crowding the gum away by packing cotton against it for several days, so that the dam could be forced above the gingival border, I prepared the cavity as seen in Fig. 69, making a slight groove immediately within the border at all points, and extending one or two horns of the cavity upward, avoiding the pulp. As will be observed, this practically surrounded the pulp with gold between which and it there was but little dentine. To make all more sure, I used the method previously described, covering the cavity with oxyphosphate, before inserting the first pieces of gold. I then filled the tooth so that it appeared as shown in Figs. 70 and 71, which give the palatal and labial aspects. Observe that very little gold shows from the labial point of view, and that though the anchorage here was very poor, it was probably sufficient, because the leverage is very slight, there being but little gold along the incisive edge. I felt quite elated at my success in this most difficult case, and turned to the lateral incisor with considerable assurance. Here I found so much decay that I was compelled to destroy the pulp, which was exposed badly. This, however, gave me a better anchorage, and I anticipated no trouble. Immediately after the pulp was removed, the patient reported continuous and excessive pain at night. I did everything to allay the mysterious suffering, and it was not till a week later that she was able to assure me positively that it was the *central* incisor which ached, and not the *lateral* incisor as we both had supposed. I then reluctantly concluded that the presence of so much gold so near the pulp, even protected by the phosphate, had resulted in a pulpitis. I drilled into the palatal side, entering the pulp-chamber, and after considerable hemorrhage removed the pulp without resorting to arsenical treatment. I am as positive as one can be that this pulp was not exposed even minutely, as we understand the term exposure. That it was very nearly approached there was no doubt, and it is plain now that it would have been better to destroy it, thus obtaining a stronger anchorage for the filling and rendering the work far less difficult. It was a case where a screw would have rendered the operation excessively tedious, because of the position of the cavity, which was almost out of sight. It was a cavity the difficulties of which cannot be appreciated from a description, even accompanied by the best illustrations, and I introduce it only to show that the immediate approach of gold to a pulp is a menace to the life of that organ. The phosphate did not prevent the disaster, because it was removed from all the grooves and deepest parts of the cavity, that the filling might be more secure, and it was in these places that the gold approached the pulp nearest. After the removal of the pulp all pain disappeared, proving that this was the offender.

FIG. 72.

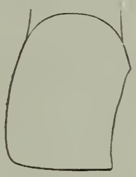


FIG. 73.

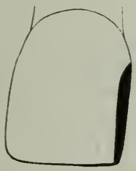
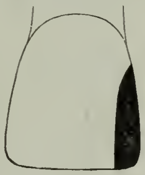


FIG. 74.



Where the approximal surface of an incisor has been only slightly lost, many men, possibly because they lack a knowledge of tooth-form, make no effort to restore contour. The eye of the true artist finds no difficulty in designating what was the original form of a given decayed tooth, for he judges from what is left of the lines, and by continuing these in his imagination has in his mind a picture of what existed before the destruction. In Fig. 72 we observe a central incisor the approximal portion of which has been lost by caries. I have seen many cases of this character filled so as to appear as seen in Fig. 73, and even filled flat, so that no gold at all was visible from the labial aspect. There may be instances where such a course would be permissible, and I am not altogether discouraging the practice of not showing much gold. The point that I would bring out is that Fig. 73 does not restore the original form of Fig. 72. The eye of the artist must see at a glance that the lines of the filling in Fig. 73 indicate a different form to that shown in Fig. 74. The production of these very slight contour fillings always indicates the hand of a master. When I see a delicate line of gold showing, which just supplies the lost tissue, I inquire the name of the dentist and place a mark to his credit. I do more than that, for where he is resident of a different city, I place him on my list of those to whom I refer patients of mine who may be traveling.

The restoration of these slight losses along the approximal surfaces brings me to the consideration of a subject which I have never seen discussed. In crowded jaws we sometimes see two teeth, let us say the superior central incisors, each decayed along the mesial surface, and yet in close contact. A glance seems to indicate that they have actually been pressed into each other. Such a condition is shown in Fig. 75. What has occurred here? As teeth have erupted posterior to this region, the decay along these surfaces has allowed the central incisors to yield and be crowded together. If they are filled with flat fillings, as in Fig. 72, we do not show gold, but we leave the teeth in their irregular and unsightly position. These teeth can be regulated, and retained in their proper, erect position by simply wedging them far enough apart to permit a restoration of contour with gold. They can be made to appear as in Fig. 76, which is assuredly more pleasing.

Fig. 75.

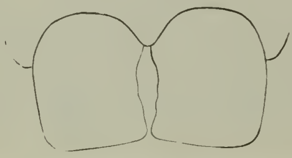


Fig. 76.

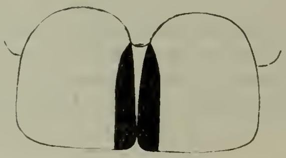


Fig. 77.

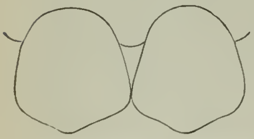


Fig. 78.

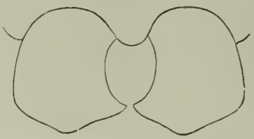
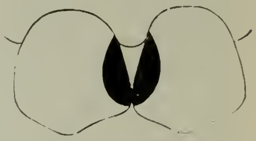


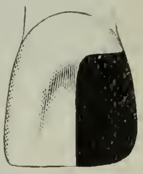
Fig. 79.



There is a departure from normal contour which is advisable, especially in the bicuspid region. In Fig. 77 we noted the normal condition, and find that though the point of contact is not very great, there is no space for the accumulation of food and *débris* because the gingiva fills what would be a space. After caries sets in, this pedicle of gum is often lost, and the teeth come to us as shown in Fig. 78. If we restore the original contour precisely, however artistic that might be, it would not be fortuitous, for it would often invite a recurrence of caries along the gingival border of the cavity. In filling such teeth it becomes necessary to produce a form which, while sightly, *will allow contact along as much surface as possible.* Fig. 79 shows teeth so filled, and a comparison with Fig. 77, while showing that we have materially departed from the original structure, indicates that we have nevertheless retained the relation between the point of contact and the gingiva, whereas with a perfect reproduction of contour we should have left a dangerous space, in which food would accumulate despite the knuckling. Here again is another contention against the use of the matrix. Where that instrument is used, especially where the teeth are not first separated, how can we possibly control the form of the filling so as to assure contact along the greatest possible surface? To me it seems simply impossible. If the matrix is not useful in these, the most difficult cases, why should we need it in those which are less perplexing?

To the minds of many dentists, the word contour seems to convey an idea only of the restoration of shape so far as concerns that part of the tooth which is exposed to view. I have seen approximal fillings beautiful in form and finish, *if looked at from the labial view*, but which at the palatal, incisive, or approximal aspects by no means restored even an approach to contour. Fig. 80 shows such a piece of work, all the imperfections of which are easily seen if we examine from the palatal side. We note that the palatal concaved surface has not been reproduced, that the approximal surface is not rounding and full, and that the incisive edge is not square, but rather sharpened to a thin edge. When I see this sort of work, I judge that the dentist is aiming chiefly to please the eye of his patient, rather than to produce a perfect contour, if indeed he has the skill to fashion what he evidently has not conceived. *To restore by contouring means to restore form from all points of view*. It is as essential at one part as at any other, for the cosmetic effects are of the least importance, though to be highly considered. In other words, we do not restore contour for beauty, but for utility.

FIG. 80.



Thus we come to the grinding-surfaces of bicuspids and molars. Shall we feel bound to reproduce the sulci when we form almost the entire surface with our filling-material? In bicuspids it is usually both advisable and necessary to do this, at least to a considerable extent. There is no object in burring out two deep pits such as are found in the normal crowns, but as the occlusion in this region is usually very accurate, the cusps of the lower opposing teeth biting squarely and sharply into the sulci of their antagonists, it becomes essential in forming the filling to remember this, and to accommodate the form to the requirements. In molars I think that a middle ground is safest. We should not make an extensive gold filling and leave it absolutely flat, for we thus offer a very poor masticating surface. At the same time, to attempt to carve out an exact reproduction of sulci as seen in a real tooth would not only be time unnecessarily spent, but the result would be really bad. I am certain that gold thus carved will not be as durable as where a mere approximation is aimed at. Such depressions as may be produced with *fairly large-sized gold-cutting burs* will leave a surface sufficiently cusped for service without making it difficult to produce a perfect polish, which is essential to durability.

This brings us to a consideration of cases where, by the attrition of energetic mastication, a patient presents with a complete set of teeth, all of them having lost about one-third of their original length. Is it necessary here to attempt a complete contour? I think not. Such a person has gradually become accustomed to having the jaws close together more than when the teeth were perfect, therefore there is no discomfort to him because of the loss in length. The necessity for interfering at all arises from the desire to prevent further destruction. In tipping a whole set of teeth with gold in this class of cases, it is only necessary to build on a sufficient thickness of gold, so that what is placed may be strong enough to prove resistant. If a molar on each side be treated in this way at the first sitting, the mouth will be opened a trifle all round, and the other teeth in turn may be built up to suit the new occlusion. In the incisors it will be found that the cutting-edges are quite broad, so that there is little difference between them and the cuspids and bicuspids. No attempt should be made to produce cutting-edges similar to what *was* in the first place. What *is*, is what the man is accustomed to, and he will be happier if his teeth are left to him as they are. Of course the filling following the lines of contour may slightly narrow the edges, but this should not be carried to an extreme.

Many cases will occur in every practice where any attempt at contour will be impossible because of the fact that the position of the tooth has changed since the destructive process began. Often we see teeth lifted from their sockets, as the decay advances, so that an occlusion is effected. To build up such a tooth to original proportions would be to open the mouth, by making that the only tooth which strikes. In these and other similar conditions judgment must have sway, and direct the hand. There will be many cases, too, which will allow only a flat filling, and in some a flat filling, while serving every purpose, will entirely alter the original form of the tooth. Fig. 81 shows an approximal view of a bicuspid, the palatal cusp and side of which have been completely lost. In such a case, if the pulp is dead, a complete contour should be attempted, anchorage in the root-canal making this perfectly safe. The result is shown in Fig. 82, the extreme edge of the remaining natural cusp being ground off to allow a masticating surface of gold only. Where the pulp is alive a totally different course should be followed, as shown in Fig. 83. Here we see that a flat filling has been resorted to, the tooth assuming the form of a *cuspid* rather than of a *bicuspid*. In this case the tip of the natural cusp is not removed, for with the shape in which the tooth is to be left mastication will not be a great menace to it, as it will where a mass of gold is inserted so as to reproduce the palatal cusp, and which acts as a powerful lever to shatter the standing wall.

FIG. 81.

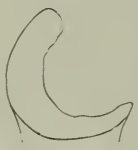


FIG. 82.

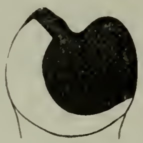
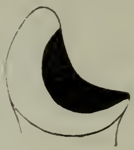


FIG. 83.



(To be continued.)

IMPROVED GUTTA-PERCHA FILLINGS.

BY W. STORER HOW, D.D.S., PHILADELPHIA, PA.

NOTWITHSTANDING the fact that gutta-percha compositions have been many years in general use by dentists for filling caried teeth, the disregard of suitable methods of manipulating these materials in common practice is a matter for serious reflection.

At one stage of the operation a prevalent custom is to transfix on a plugger-point a pellet of gutta-percha and hold it over or in the flame of the annealing lamp until the pellet is guessed to be sufficiently softened for use. The frequent result is a more or less burned pellet and a consequently imperfect filling. Yet such is the inherent excellence of the thus abused plastic material that the tooth will probably be preserved long enough to encourage the reckless operator in a continuance of this barbaric process, although it is more than likely that he will be heard from in some dental society meeting discussing the subject of "Gutta-percha as a temporary dental stopping." The fact is that, when properly placed, a gutta-percha filling is not only permanently protective of its territory in the tooth under ordinary circumstances, but is the most comfortable and compatible material for the purpose that has thus far been employed by the profession.

FIG. 1.

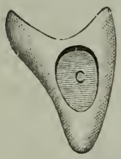


FIG. 2.

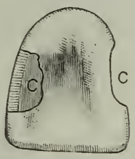
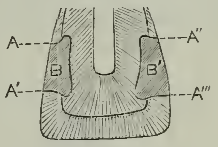


FIG. 3.



With the object, therefore, of directing renewed attention to the subject from a strictly scientific and utilitarian point of view, and at the risk of saying some things which are already well known, though but seldom put in practice, the present paper has been prepared.

Certain classes of cavities, especially those of a compound coronal character, are excluded from this consideration as requiring material more capable of resisting the forces of mastication than is gutta-percha in most of its compounds. A recent preparation, however, possesses a density and toughness which admit of employment in the coronal cavities of deciduous molars and such permanent molars and bicuspids as are not subject to hard usage.

Leaving out of view the excepted classes, most other caried dental cavities may be well, and in many cases permanently, filled with a good gutta-percha compound. The composite character of all the gutta-perchas designed for dental uses is of course inferred by the term gutta-percha as herein descriptively employed, and the peculiar working properties of the material make it imperative that the preparation of cavities to receive it shall proceed upon lines directly related to those properties.

Many approximal cavities like *C*, Figs. 1, 2, may well be filled with gutta-percha, and such as *C*, Fig. 2, where a gold filling would show through the thin enamel front, can better be filled with suitable gutta-percha. The section, Fig. 3, shows the angles *A*, *A′*, which should be given the enamel-edges when practicable, and in any case the enamel-margin should have a squarely defined angle at its surface border.

Cervico-labial or buccal cavities, as shown in Figs. 4, 5, 6, 7, 8, admit of permanent gutta-percha fillings. Of course due attention must be given to the retention of the fillings by enlarging the interior walls of the cavities when they have not already such expansions. After suitably preparing the cavity, it should be made as dry as possible and so kept. The problem of conveniently and properly softening pellets of gutta-percha has been solved by the production of the thermoscopic heater shown in Fig. 9, which approximates the exact size of the device. The heater is in this instance made of steatite, because of its heat-retaining property and the desirable physical qualities of its surface. The handle is of wood, at the opposite end from which, in the center of the circular recess, is a small disk (*A*) of metal, fusible at about 212° F. On the heater near the metal a suitable number of gutta-percha pellets, as 1, 1, are placed, and the heater held over the flame of the annealing lamp or burner (as in the illustration) until the fusible metal melts, when the heater is placed on a piece of cardboard (or an empty foil-book), and the gutta-percha will be found to be properly softened. The steatite plaque retains the heat long enough for an ordinary operation, but if the metal meantime loses its fluidity and so indicates a lowering of the standard heat, it may be quickly restored by a moment's holding of the heater over the flame, which will again fuse the metal.

FIG. 4.

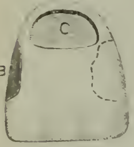


FIG. 5.

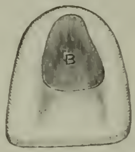


FIG. 6.

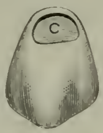


FIG. 7.

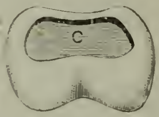


FIG. 8.

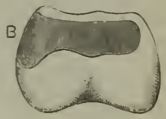
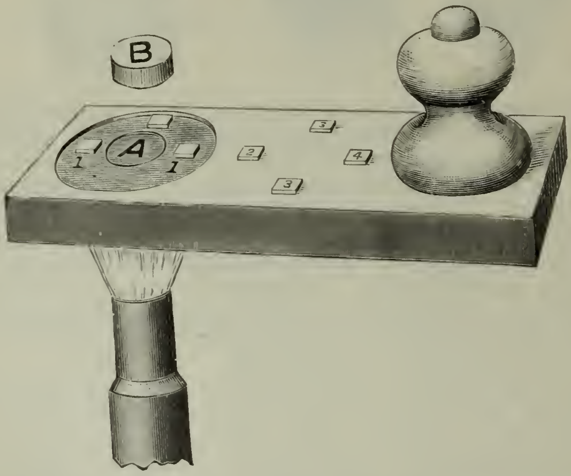


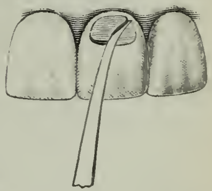
FIG. 9.



The dental gutta-perchas vary considerably in the temperatures of their softening points, and hence their degrees of plasticity at the boiling point of water will be notably different. The absence until now of a practically available thermoscopic standard of temperature has precluded the attainment of anything like uniformity of practice or unanimity of opinion regarding the proper plasticity for obtaining the best results. There is little doubt, however, that the gutta-perchas have been of the "low-heat" sort, and have been generally overheated in use. The common phrase "sticky" is indicative of the usual desire that the material should be so softened as to "stick" to the cavity-walls, whereas such sticky stuff had either an adventitious substance to render it very soft at a low heat, or, if made of good stock, must have been injured by a heat high enough to make it "sticky."

The heater shown at Fig. 9 admits of a ready graduation of temperature to suit each of the various gutta-perchas at present in use. When the flame is applied directly under the metal, as in the illustration, the material placed at 1 will, when the metal is seen to be fused, be at the heat of near 208° F., while the pellets at 2 will be heated to about 200°, those at 3 and 4 to near 194° and 180° respectively. Of course the location of the heat-source will produce corresponding variations in the relative temperatures of the materials as severally situated; but with a visibly definite standard such as the metal *A*, having a known fusing point, the desired degree of heat may be repeatedly produced at any place on the receiving surface of the heater. A few seconds' continuance of the heater over the flame, after the metal has melted, will raise the surface heat to 212° or 215°, as the case may be; but as a suitable indicator for a high-heat stopping, a button (*B*) of metal fusing at 230° is provided as a substitute for *A*, which is first melted and poured out on a piece of clean paper, the heater cavity being undercut so that when cold the metal cannot be shaken out. The boiling of a few drops of water in the heater cavity will likewise serve to indicate the proper temperature, but the fusible metal is in every way preferable. When the metal becomes fluid, the heater is set on a piece of paper at a convenient place on the bracket-table, and the gutta-percha is found to be softened ready for use. The preferable procedure is to hold the heater over the flame until the metal melts, set down the heater, blow hot air into the previously prepared and dry cavity until the tooth is sensibly warm, hold the heater again over the flame to melt the metal, and then with a suitable broad and cold instrument pick from the heater a pellet or group of pellets sufficient to a little more than fill the cavity, and by a quick firm rocking pressure force the mass into the cavity as if it were sought to take an impression of the same. Then dip the instrument into ice-water, wipe dry, and hold it firmly against the filling for one or more minutes, after which with a keen-edged thin blade pare off the surplus, cutting from the center obliquely toward the margin, as in Fig. 10, taking great care that the filling *B* shall be flush with the cavity-margin at every point, as at *A*, *A'*, Figs. 11 and 12.

FIG. 10.



Access to approximal cavities, as *C*, *C*, Figs. 1 and 2, will seldom permit the instantaneous mass-method just described, but in many such cases a warm, broad, flat blade, as stiff as the space will admit, can by repeated quick pressures be made to squeeze the soft mass into the cavity of the warmed tooth, and be instantly followed by a very thin strip of metal held tightly in both hands and wrapped with hard pressure over the filling around that side of the tooth, to both condense and contour the plastic and produce the closest adaptation of the material to all parts of the cavity-walls.

There is good reason for the belief that the common mode of successively introducing small pieces of imperfectly softened gutta-percha into a comparatively cold cavity, and employing instrument-points more or less heated for packing the cooled plastic against one side of the cavity after the other, must in the nature of the case result in a leaky filling, such as gutta-percha is commonly said to make, whereas the defect is due not to the material, but to its inconsiderate manipulator.

In order to definitely determine whether or not suitably softened gutta-percha inserted by the mass-method will make a moisture-tight filling, some porcelain teeth of natural sizes and forms were made, having cut in them, prior to baking, cavities of the class shown in Figs. 1 to 8. These cavities have been filled with gutta-percha, leaving a surplus over the margins as at *a*, *a′*, Fig. 13, and when quite cool paring them flush as at *A*, *A′*, Figs. 11 and 12, and after several days' immersion in dilute aniline ink, the fillings have been removed without a trace of color showing on the walls of either the fillings or the cavities. The only exceptions have been where the margins were rounded, as at *a*,*a′*, Fig. 13, and the fillings not cut below them as shown, but left feather-edged as at *d*,*d′*, Fig. 15. In these few instances discolorations were found under the laps, but in no case extending farther than to *A′*, *A′*, Fig. 16. The tests prove that under conditions as nearly practically parallel as extra oral tests can well be, gutta-percha fillings properly made will exclude external moisture. Obviously, it is better to pare the filling below the enamel-slopes, as in Figs. 14 and 16, rather than to leave it overlapping, as in Figs. 13 and 15. For a final finish use a rapidly revolved, lightly-touching cuttle-fish paper disk, followed by a wisp of bibulous paper or piece of tape wet with chloro-percha, applied for but an instant, to glaze the surface of the filling.

FIG. 11.

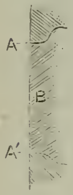


FIG. 12.

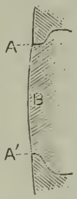


FIG. 13.

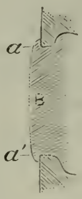


FIG. 14.

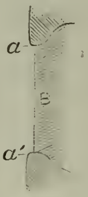


FIG. 15.

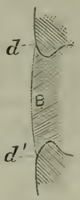
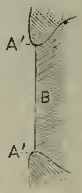
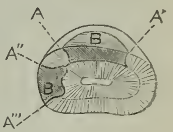


FIG. 16.



In the case of a very thin enamel front like that of Fig. 2, that part of the cavity *C* may be varnished with thin chloro-percha and dried with hot air just prior to filling it as before said. It might first be thinly coated with a tinted oxyphosphate or oxychloride of zinc, which should be given ample time to harden before placing the gutta-percha. Indeed, it is a fundamental feature of good gutta-percha work that while one cannot operate too rapidly when the plastic is at its proper temperature, the preparatory and completing processes should be given as much time, care, and close scrutiny as more elaborate and often less enduring gold operations. There is furthermore room for the exercise of the artistic faculty in having at hand chloro-percha or cellulose varnish of varied colors, with which, by means of a small brush, a gutta-percha filling as *B*, Fig. 4, and one in the like cavity *C*, may be given an inconspicuous shade, and the painting be renewed from time to time, if that be necessary by reason of wear. Fig. 17 is a sectional view of fillings like *B*, *C*, Fig. 4.

Fig. 17.



A more elaborate heater than that shown is contemplated, but the present device is submitted in the hope that its simplicity and effectiveness will induce a general adoption of improved methods in the manipulation of one of the very best dental preservatives within the ready reach of the profession.

It is obvious that the heater may be placed upon the shield of the annealing lamp instead of holding it by the handle, which will serve for its ready removal when the metal melts. It may likewise be placed on the ring or receiver of Dr. Flagg's heater, and be swung away from the flame when the proper heat shall be thermoscopically indicated ; or the flame and receiver may be so adjusted as to continuously keep the heat at the melting-point of the metal in the heater, on which the instrument-points may also be heated as usual.

It will doubtless be remarked by some hasty operator that there is the loss of a full minute's time by the hand-holding of the heater over the flame ; but therein consists the excellence of the device, inasmuch as this process of gradually raising the temperature of the gutta-percha to the point of proper plasticity without impairment or disintegration of its singularly susceptible structure and the stopping of the heat action on the instant of the indication of the heat limit demands the attention of the operator (or his assistant), and well rewards him for taking time to conduct the process with due regard to the peculiar properties of the material and to his duty as a presumably proficient practitioner.

By this means it is furthermore practicable to employ a recently prepared gutta-percha which properly softens at the temperature of 225° F., and requires a warmed broad instrument for its insertion by the mass-method described.

If the floor of the cavity closely approximates the pulp, it should first be protected by a layer of cement or low-heat gutta-percha, and the high-heat material be superimposed. In large cavities with frail walls, one or other of those methods is also preferable, but the new material is so dense and hard that in cases where the walls are strong it may be used, even when required to resist some masticatory action. The high-heat gutta-percha is especially adaptable for filling the large cavities in pulpless teeth which are to be put on probation to determine whether or not the root-fillings are efficient in maintaining the teeth in a comfortable condition. It is also hard enough to form a firm base for an inlay of metal or porcelain. In the latter case the porcelain can be ground flush, and the thin marginal septum of gutta-percha be picked out with a thin excavator and replaced with gold foil or mat gold, taking care to remove the gutta-percha in sections on opposite sides of the inlay, and to fill in with mat gold before the successive sections are removed.

In all the foregoing instances the continued dryness of the work until completed is predicated, but of course in the exigencies of practice there are many cases where dryness of the cavity can with difficulty be obtained, or maintained for but a few minutes at a time, and for most of these the instantaneous method of insertion is very well adapted, leaving the paring process to follow the unavoidable influx of moisture. Such filled cavities are shown in Figs. 18, 19, 20, and 21.

FIG. 18.

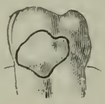


FIG. 19.

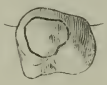


FIG. 20.

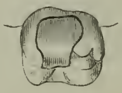
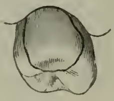


FIG. 21.



The heater, Fig. 9, will be found useful in setting artificial crowns, inlays, and metal facings or caps, which may be placed on it and so brought to the precise temperature of the softened gutta-percha with which they are to be mounted. In fact, it will be advantageous to thus warm a crown or bridge prior to setting it with cement.

It will certainly prove worth while for most practitioners to revise their views of the value of gutta-percha, as it is beyond question in many cases a permanent filling-material when manipulated in accordance with a scientific appreciation of its working properties and special adaptation to the frequent requirements of all thoroughgoing members of the profession.

THE ETHNOLOGY OF THE FACE.

BY ALTON H. THOMPSON, D.D.S., TOPEKA, KANSAS.

(Continued from page 181.)

DEDUCTIONS AND CONCLUSIONS.

IT would be presumptuous, perhaps, to attempt the construction of an elaborate scheme of ethnology of the facial features from the meager amount of material which we have collected, yet there is little doubt that an approximately positive system could be elaborated from a complete series of reliable data. The matter of accurate data is, however, the main difficulty; for such recorded observations as do exist have been made with a careless disregard of the racial purity of the individuals observed. In compiling the preceding tables, great care has been taken to eliminate data which have reference to mixed races, and such only selected as evidently belong to pure types. Such types still exist, thanks to the persistence of primitive forms, and need to be studied carefully in order to enable the observer to discriminate between pure and mixed forms. Without attempting either extensive classification or scientific exactness, perhaps we may be allowed to speculate upon our observations, and frame a few generalizations that may indicate, in an imperfect way, what might be done in tracing the descent of the facial features and their ethnological significance, if more exact and extensive data were furnished us.

The doctrine of the persistence of type is the basal principle of our theory, and of the truth of which there can be little doubt. The faces on the monuments of Egypt are good likenesses of the faces found in Egypt to-day, although three or four thousand years lie between them in the history of the people. The types of the light and dark races of the peoples of Europe are still persistent, and reappear constantly in well-marked individuals among the descendants of Europeans. The pure negro types of Africa still reappear in perfect purity of typal form, in spite of constant racial mixture with other radical forms from all directions. The Aryan type in India is still strongly marked, despite its mixture with Mongols, Europeans, and Australoids. It constantly reappears in all its original purity. Perhaps the best example of the persistence of type is furnished by the European immigrants who have peopled the two Americas, and who have engulfed the native races. The English, the Irish, the Scotch, the German types reappear in all their primitive purity in families which have been mixed for centuries and generations. Individuals constantly crop out who would pass for pure specimens on the native soil of these types. The descendants of the Spanish and French immigrants still furnish pure-type individuals who would pass for ideals of their nationalities in Paris or Castile. And these types are preserved in spite of centuries of intermixture with other and alien races which produces whole generations of mixed individuals. The law of atavism prevails to such an extent that old forms reappear in families where they had been forgotten. This is frequently illustrated by the sudden reappearance of a feature, as for instance red hair, in a family in which such a feature was, so far as the history of the family was remembered, totally unknown. This law applies to all the features, and accounts for the appearance of any unusual features in a family. Then again, constant heredity causes the persistence of features which are passed down from generation to generation, and which often become a family characteristic. These peculiarities are often typical of sub-races, or indeed of the primitive branches of the race, which have been handed down in their purity. It does not matter that features often become composite by crossing ; the composite feature is an accident, and is not transmitted. Some sub-types are, of course, created by crossing, which have arisen from the composites thus formed, and these sub-types have themselves thus become permanent. The persistence of primitive types, and their constant reappearance, is one of the curiosities of this study. These are, indeed, the only types that can be made out with certainty, for it is difficult to decide where the sub-types originated and to what sub-race of peoples they belong. That difficulty makes the analysis of all faces difficult ; for, while we may recognize a feature as distinct and typal in form, we cannot say where it came from, or what was its line of descent. It is probable that an extensive collection of positive data might illuminate this obscure part of our subject, but for the present the data are insufficient.

However, in order to show the direction that the study might be made to take, and as an indication of what might be accomplished by a full series of reliable observations, let us attempt the analysis of some of the features as found in the European races, with which we are most familiar.

The Hair.—Beginning with the hair, as a most conspicuous feature, we find that each of the primal types of mankind has a distinct kind and color of hair, which is characteristic. Every kind of hair originated with a particular race, and when found in the mixed races must be assumed to be descended from that race. We assume this from what we know of the fact of the persistence of type. The danger of error lies in the diagnosis.

Beginning with the Australoid races, we find that the variety of hair with this type is dark brown or black, fine and wavy or curly, with full curly beard. This kind of hair we find extends by extensive gradations and mixture through Polynesia, Indo-China, India, Western Asia, to Northern Africa and Southern Europe. Wherever we find curly hair, we may be as sure as anything can be in this crude study, that it is of Australoid origin and indicates Australoid descent. The brown races of Europe and Southern Asia, the Melanochroi, are largely Australoid in their features, so that this relation of the hair is no surprise. This form of hair is not a modification of the Negroid by crossing, as it is not crisp and woolly, and the cross-section is very different.

The Mongoloid form of hair is black, straight, stiff, and coarse. It extends over Northern and Eastern Asia into Indo-China and Japan, and permeates the Melanochroid races of Europe, some of which have stiff, straight, black hair. The American Indian also has this form, which is distinctly Mongoloid. The Fins of Northern Europe originally had red hair with freckled skin, and this has penetrated through the light and dark races of Europe, and often reappears in its purity. Topinard says it is of Finnish origin. The Melanochroid races thus derive their types of hair from both Australoid and Mongoloid primal races, but the Xanthochroid form is a distinct and a primary type. It is light, flaxen, blonde, or chestnut, and is fine, and straight or wavy. It is found in its greatest purity in Northern Europe and in the mountains of Northern Africa. The descendants of the type are found all over the world, wherever the Saxon race has gone, and it constantly reappears as pure as ever. Beautiful examples are found even in America.

Cephalic Contour.—The cephalic index, as indeed do most cranial indices, has only a very general significance and value. We know that some races are generally dolichocephalic and that others are brachycephalic, but among the skulls of a brachycephalic race some will be found that are dolichocephalic, and *vice versa :* and thus by assuming that all the skulls found in a given place belong to one stock, the averages struck are misleading. We know that an Australoid skull is dolichocephalic and that a Mongoloid is brachycephalic, generally speaking, but we find some Mongols are dolichocephalic, and so it goes. In the races of Europe the two forms are inextricably mixed and graded in all intermediate forms. Generally speaking, the Melanochroid races are brachycephalic and the Xanthochroid are dolichocephalic, but they are greatly mixed, so that the skull form is of little value for guidance.

Prognathism.—Prognathism seems to bear a direct relation to the position of races in the scale of civilization, and is proportioned to the cephalic development and intellectual power. In the lower races the jaw protrudes and the brain recedes. In the higher races the brain advances and the jaw retreats, and the face becomes more perpendicular. Prognathism has little ethnical significance, as it is only a factor, if of any value, as an aid in indicating the civilizing capabilities of a race. Prognathism is an inheritance from a low stage of civilization, and when it appears in the higher races, which are orthognathous, indicates lower brain-power or positive defectiveness, as in idiots. The stage of prognathism of a race indicates its scale of relationship to the apes ; the most prognathous races are nearer to them, and the higher races, the orthognathous, are farther away. In dental practice this must be made allowance for, as we shall notice later on, in dealing with low races.

The Forehead.—This might be classed with prognathism, as its height and fullness bear a more or less direct relation to the brain-power of a race. Its form, however, is often of distinct ethnical significance, and sometimes a peculiarity of it is positively indicative of descent from a sub-race. It is the subject of many minor variations, each of which has a history, if it can be read aright. Thus we observe that the Berber and Kabyle forehead, the pure stock, has a deep depression across the base, a little above the brow-ridges, extending from one temple to the other. This is a typical feature, and is probably a primitive Berber form. It is found in some of the Melanochroids of Southern Europe, especially in the Iberian races, and shows a strain of Berber blood. This peculiarity has found its way through the dark Europeans to all lands, and is often observed in full form in their descendants. It is distinct from that depression produced by excessive fullness of the brow-ridges, for it is independent of and is a perfect groove separate from these ridges. So other peculiarities of the forehead, and as well of the other features, could be analyzed and located if we had the data of careful observations.

The Brow-ridges.—This feature presents great variation. They are very full and thick in the Australoid races,—probably an accompaniment of their low stage of development, and approaching the form of the apes, in which the superciliary ridges are strongly marked. In the Negroid races the ridges are low and flat, and in the higher races all variations are found. In some they are full and high, in others full and sharp ; others are low and smooth or low and sharp. There is a difference also in the arches, whether low or high, wide or narrow, and in their being level or oblique. The American Indian has high and sharp ridges in most tribes, and the Mongoloid races usually have flat and low ridges and glabella,—almost obliterated, in fact. But beyond this we can say but little of the ethnical significance of this feature. It is not like prognathism in being very pronounced in lower races and reduced in higher races, for some of the former, as the African negro, have low, smooth brow-ridges and glabella, and some of the latter, as the Europeans, the Celtic branches, have very high ridges. It is possible the ethnical descent of some of the peculiarities of this feature could be followed out by the careful study of good material.

The Eyes.—This feature has decided ethnic significance, but the data are quite meager. The color, size, and form of the iris, the prominence or depth of the ball, the contour of the orbit, the angle and length of the opening of the lids, the variations of the distance between the eyes, etc., are very decided, and many observations have been made, but there are few that bear the impress of coming from pure stock. As most of the primitive races are dark, dark eyes are more numerous, and light eyes are of less frequent occurrence over the world. The dark soft eyes of the Semitic stock have penetrated through the Melanochroid races, and have reached the ends of the earth, but are of undoubted Semitic origin. The small oblique eyes of the Mongol have appeared in the European races to some extent, and the half-open eye of the Australoid is also found in Europe. Light eyes have gone with the Xanthochroid to the ends of the earth, but they are not persistent, and are easily modified by crossing or climate, like the complexion of their owners. This important feature has many marked peculiarities which are often characteristic of sub-races, the affinities of which further study would bring to light and properly locate.

(To be continued.)

PROCEEDINGS OF DENTAL SOCIETIES.

TWENTY-THIRD ANNIVERSARY MEETING OF THE FIRST DISTRICT DENTAL SOCIETY OF THE STATE OF NEW YORK.

(Continued from page 224.)

SECOND SESSION.

THE meeting was called to order by the president, Dr. Norman W. Kingsley, Tuesday, January 19, at two o'clock P.M.

Dr. Calvin S. Case, Jackson, Mich., read a paper entitled, "Borders between the Natural and Artificial in Crown- and Bridge-Work."*

Discussion.

Dr. Charles J. Essig. I agree with Dr. Case's statement about the want of precision in the great majority of crown- and bridge-cases, although I should scarcely agree with him that the want of care was willful. The operation of fitting a cap or a ring to a root is very difficult, and requires perfect accuracy. I have seen several roots that have been removed after bridges or crowns have been fastened to them, and I have rarely seen one where there has been precision in fitting the band. The form of the root is often very tapering, and in fitting a band under the gum we are apt to fail, through difficulty in determining its exact form, to obtain a perfect adaptation of the ferrule to the root. I regretted that Dr. Case was not a little more specific in his description of the preparation of the root. Of course, that depends much on the condition of the root when we first see it. We may find a root very much decayed in this way [illustrating], way below the margin of the gum, with a funnel-shaped canal in the center. To fit a cap under such conditions would be very difficult, and I am sorry Dr. Case did not tell us how he would treat a root of that kind. In my own practice, where I have had the chance to prepare a root to my own liking, I spare as much of the tooth as possible, and do not go very far beyond the margin of the gum. Suppose we have a central tooth which is discolored or broken to such an extent that we find it necessary to crown it. How shall we prepare that root? Shall we cut it off in its entire circumference to the margin of the gum? I should cut the root off in this way [illustrating], saving as much as possible of the lingual portion and beveling to a little above the margin of the gum on the outer or labial portion, so that the porcelain face may be carried under the gum to conceal the line of union. No gold should be visible in front. The cap I prefer is a partial cap.

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* Printed in full in the DENTAL COSMOS for March, page 204.

There is another important point that I have listened to with much interest, and that is the manner in which Dr. Case measures the root and fits the cap. It seems to me that a plaster model would be a great deal better to depend upon than a piece of wood which is made hap-hazard, or a piece of wire fitted to the root. Measuring by wire coiled around the root is largely employed, but has never been satisfactory to me. After we have gotten such a model as plaster will give us, we certainly have a pretty good fac-simile of our case from which we may obtain very reliable measurement. Then the next step is to cut away the plaster model below the margin of the gum, so as to allow you to fit the cap. This model will be found to be pretty nearly like the root. If it is made of good plaster and thoroughly dried, then well saturated with thin sandarac varnish, and allowed to dry again, you will have a model that is hard enough to work on without injury; but precision in fitting the cap can, in many cases, only be obtained by fitting the band as well as you can, on your model; soldering it together, or making the ring first before you put the floor on, and then fitting it upon the root itself. Force it up into the position that you want it in, and then see how it fits. Of course, it is well at the very beginning to make some preliminary preparation of the root. If you can determine that the edge of the root which is out of the gum has a decidedly tapering form, this must be remedied before taking the impression.

I also agree with Dr. Case in what he said about the want of precision in fitting the cap and pin together. Without the cap, the pin sustains all the force. The force of mastication is thrown upon the long axis of the tooth instead of upon the socket, where it properly belongs, and there is danger of fracture of the root of the tooth; we have all doubtless met with such accidents. If the cap does not fit the root well, it is no reinforcement to the pin; so it becomes necessary, in order to make one serve the other, to have the cap fit accurately. Much of the work of preparing crowns may be done by the mechanical dentist, and this is a saving to both operator and patient. I do not like to make a laboratory of my office, and a method of procedure which obliges a dentist to go from the work-bench to the mouth of the patient will prove wearing and distasteful to both. The plaster model, on which most of the work can be accomplished, will save much time to the dentist and annoyance to the patient.

After the ring or ferrule has been so made, however, it may then be adjusted to the natural root. When the cap is fitted on the root, if it stands away from the sides it can be burnished back; it cannot be adjusted to the root accurately at any other time. Then you can finish putting the floor on, and the cap is then ready for the reception of the tooth ; but it would be better to try it once more in the mouth. Dr. Case remarked about the accuracy of the adjustment of the pin. The correct relation of the pin and cap is important. If the pin fits well and the cap stands away from the root, it will give no additional strength to the pin, and when the force is thrown upon it, it may bend or break, or the root may split.

The last point that attracted my attention was the use of pure gold, instead of one of the alloys, in the formation of the cap. I have found pure gold too ductile, so that even after we have fitted a cap to a tooth, with the object of making it reinforce the pin, it is quite possible that we may have a yielding of the soft gold. I much prefer one of the alloys of gold. Coin or standard gold affords greater strength and better results. Coin gold is very much stronger ; it has a tenacity of 70 or 80, while pure gold has only about 20 or 25, and I should therefore favor the use of coin gold. By taking proper precaution and giving every detail of the operation due care, we can get a sufficient adjustment, without depending upon the burnisher to make the cap fit the root.

Dr. F. T. Van Woert. I dislike very much to take exception to anything offered by so able and prominent a member of our profession as Dr. Case, but I cannot feel that his view of the matter is just right. In the first place, he says "the profession is very decided in her rules relative to the finish of fillings, and quick to manifest disapproval of any operation that leaves overlapping edges of gold at the cervical border, even though it be far beneath the margin of the gum," and then asks if anything like the same anxiety arises respecting gold bands adjusted for crowns.

In return, I would ask, Why not? Are not the gentlemen who exercise such care in one operation sure to do so in all ; and why should they give more to one than to the other? They are certainly skilled operators, and when you have said that, it implies that they are skillful in all operations they undertake. Show me the man who will see to it that the margins of his fillings are perfectly finished, and I will introduce to you one who will take just as much pains in any operation, whether it be the adjustment of a band for a crown, or the insertion of a crown filling of amalgam. I will grant that there are many whose only object in setting crowns seems to be with respect to general appearance, and the fee obtained ; but these, I am very happy to say, are largely in the minority. The profession has reason to be proud of the many expert operators in its ranks throughout the country who are doing crown- and bridge-work, I might say, almost perfectly.

The doctor offers as evidence of this defective manipulation the unhealthy appearance of the gums around such teeth or bands. While I am free to acknowledge the imperfect adaptation of appliances in many cases, still I do maintain that there are just as many where the gums will be found congested and unhealthy over perfect-fitting bands, particularly when applied to the six anterior teeth. It is very strange, nevertheless a fact, that bicuspids and molars take kindly to bands or ferrules, while the incisors and cuspids are the reverse, especially the superior centrals. Therefore I never use a band crown on these teeth unless absolutely necessary. The only possible advantage of a band is to add strength to the crown and root, or, in other words, protect the root from fracture. This same object may be accomplished in a different manner without encroaching upon the pericemental membrane, as follows :

In the preparation of a root, the face should be cut on a straight line from the center to the gum-margin on the labial surface, forming an incline ; and from the center to the palatal gum-margin, forming a quarter-circle. Then drill, and fit the dowel into the root ; after which bend a piece of pure gold the shape of the root as nearly as possible ; trim to something like the contour of the circumference, after which place it on the end of the root, and drive the pin through it and to place. Now remove the whole, solder, and readjust, when the plate can be perfectly adapted to the ends of the root by a small pine stick and a gold plugging mallet. Now, by removing, you will find the outside margins of the root clearly defined on the under side of the plate, permitting you to follow accurately with the corundum wheel the exact shape of the root. After soldering the face to this floor, you have a crown possessing all the advantages of a band crown, and the great merit as well of not encroaching upon the pericemental membrane.

I am surprised to learn, from this paper, that there are members of our profession who so enjoy labor that they attempt to finish bands after a crown has been set. They certainly cannot believe it possible to finish a band in this manner, anything like perfectly ; in fact, I have great doubts as to whether it is possible to half accomplish this feat without permanent injury to the root. By all means finish the band before setting the crown.

Again, the essayist says he has heard it argued that roots should be conically shaped, so that when a band is driven on it will be stretched to a close union at the edge. He claims this to be theoretically possible, but seldom accomplished. This, I think, is another mistake. It has been, and is, my practice to so shape roots when I use a band ; and I know of many others, in our city here, who are pursuing the same course. I grant that there are frequently small inequalities which it is better to burnish the band to than to attempt to cut away ; but it surely is less difficult to burnish to one or two small defects of this kind than it is to the whole circumference of the root.

I do not believe, as Dr. Case does, that it is better to work from a model, preferring, myself, the natural root ; still, this is a personal matter : it is simply a question of the method best adapted to the individual. As to the instruments used for trimming roots, I have never been able to secure one that would accomplish what corundum wheels and emery-paper disks will do. I prefer them to any steel instrument that I have ever seen. However, it makes very little difference what instruments are used, so long as the results are accomplished and the end attained.

This principle of crowning which I have just described is practically the same theory as that advanced by Professor Essig. One of its strongest points is that it preserves very much more of the tooth-substance than any other I know of. The principle of the V and half-circle, or a combination of both, in the preparation of a root to receive a crown, is an old one ; nevertheless I consider it, as I have already stated, one of the best. I am utterly opposed to the least sacrifice of tooth-substance where it can possibly be saved.

Respecting band crowns, I do not think it possible to make and set a band crown after the method described by Dr. Case in anything like so short a time as when the band is adjusted to the root directly, without the use of silver wire, whittled form, etc. To illustrate this, I will cite a case where I cut off the crown of a badly-decayed superior left first bicuspid, shaped the root conically, finished and adjusted the band, applied the rubber-dam, filled the roots, and inserted a porcelain tip, the entire operation consuming thirty-eight minutes. I presume this seems to you an exaggeration ; but, gentlemen, you can all examine the crown, as the operation was performed for the chairman of your executive committee at a clinic given in my office. There are, as well, a number of gentlemen present who witnessed the operation. I am confident that Dr. Case would consume a great deal more time, and with no better results, with his complicated method. The complication of any operation lessens the chance of its final success, and certainly adds very much to the discomfort of the patient and operator, to say nothing of its being less profitable to the dentist.

I have no doubt that Dr. Case accomplishes very satisfactory results with his method, but I have very grave doubts as to whether it would be practical in the hands of the average practitioner. In fact, I question if there are half a dozen present who could follow it strictly and attain the results claimed. I am sure I could not. A parent's love for his child blinds him to its malformations and deformities ; and Dr. Case, as the father of this system, is probably blinded to many of its defects ; but I detect the imperfections in it which I have noted, and feel it to be a duty I owe to him, the profession, and myself to point out these facts, that he may take measures to remedy them, or convince me that I am in error by sustaining the points claimed. It is these adverse criticisms of our ideas that make us more perfect in our art and spur us on to higher attainments.

Dr. C. Frank Bliven. In constructing artificial crowns there are three things to be considered in the order enumerated, viz : strength, beauty, and ease of repair. In discussing this subject it is difficult to confine one's words to borders, for the reason that these are so closely related to the crown that in speaking of them one hardly knows where to draw the dividing line.

As strength is the most essential quality, we will speak of that first. For example, take an incisor. You are all familiar with its anatomical construction and the manner in which the enamel overlaps the dentine. The nearer we conform to these natural principles, the stronger the crown will be. In the selection of a material, the nearer it is like the enamel the less irritation we shall have at the border. I do not like gold for this purpose, because it makes an excellent foothold for the lodgment of secretions of the mouth, and the influence of bacteria thereon is destructive to the surrounding tissues.

I believe we have in porcelain the only material at the present day that answers the purpose. In preparing the borders, the more we cut the tooth away toward the apex, the weaker the crown ; for instance, in the Richmond crown the force is applied in an oblique angle, making a fulcrum at the labial point of attachment, thereby having a tendency to lift the pivot from the root as a tack or nail is drawn with a claw-hammer.

Dr. Van Woert's method, which he has just described, seems to me to be much more practical, for the reason that it brings the fulcrum nearest to the point of greatest resistance.

The essayist, in his measurement of roots, has lost sight of the fact that the labial aspect is much higher than the palatal, and, unless the tissues are torn away at the palatal point, his suture-wire measure will be much larger than the circumference of the root, and if his band is made the same size as the wire it will be correspondingly too large. If a cap must be used, why not use the band itself to take the measurement, place it around the root with a ligature about it, draw it tight, mark, cut, and solder? This, to me, seems the most practical method. If anyone questions this, let him examine the work done by Dr. J. Rollo Knapp, of New Orleans. This is the method practiced by him, and I think it stands for itself.

I have heard operators say that they leave the little projecting portion of enamel at the palatal border and burnish their band over it for support. Is it possible to burnish gold down without expanding it at the approximal surfaces? I think not. I know fine gold is very ductile, and can be spun nicely, but the conditions for doing it we do not find in the mouth. I do not believe this is necessary; it is an exceedingly difficult thing to do, and I agree with Dr. Essig when he says that the making of an accurately-fitting cap is one of the most difficult things we have to do. I think I have been able to read between the lines of the essayist's paper, and there find that he is an excellent workman. But why should he waste time and energy when there are much simpler methods? However expert an operator may be, the simpler he makes his operation the more successful it will be.

I find it unnecessary, with but few exceptions, to make caps. The burnishing of a piece of pure gold onto a hickory stick, removing it and having it fit the root accurately as a cap should, is almost an impossibility.

Dr. Baker, of Boston, several years ago introduced a method which was a good one if one does not object to the extra labor. He places a piece of thin copper about the root (tagger's tin is best for this purpose), ligates it to hold it securely in place, and forces plaster of Paris into the open end; after the plaster has set it is removed, and fusible metal is poured into the end that was about the root. This makes an excellent model upon which to construct the cap.

The next point to consider is that of beauty. All methods where the band must sooner or later show are undesirable. For this reason I strongly object to them, and I rarely find them necessary. There are other simpler and superior methods. Let me submit for your consideration the one I have used for years: it is to prepare the root like a truncated cone, concaving the labial surface; then I prepare a platinum cornucopia, introduce the pivot at the apex, trimming the platinum form so that it will extend slightly under the margin of the gum, and burnish to place. Upon this form I construct an all-porcelain crown similar to thickened enamel. For strength, beauty, and ease of repair this method, in my practice, has been prolific of the best results. This crown gives me a border at once strong, beautiful, and non-irritating,—one that is not approached by any other method with which I am familiar.

In one instance the facing made from a rubber plate tooth, where part of the pins were left in, broke in front of them from near the gum line to the cutting-edge, leaving the backing and part of the tooth intact, indicating a defective tooth. This is the only unsatisfactory result I can record.

The last point to consider is ease of repair, which may not properly enter into the discussion of this paper, but is a related question, the consideration of which should not be omitted.

When the pivot is long enough and stands properly in the root, I should proceed as I did in repairing the tooth above mentioned. After removing the broken parts, leaving the pivot intact, make a platinum cornucopia, solder to it a tube to fit the pivot, build the crown upon this form, and cement into position. Thus the former conditions of the tooth are restored.

In other crowns the facings are frequently broken away from their metallic backings, and are not easily replaced. The easiest method I have found, especially with bridges, is to burnish a piece of No. 60 platinum into the depression, making holes for the pins. Place about them a close-fitting box, and solder with pure gold. Fill the matrix with porcelain body, and fuse over it a facing of proper shape and shade. After fusing in a furnace, remove the matrix and secure into position with a strong cement of the right shade.

I think that for crown- and bridge-work, an all-porcelain system that gives strength, beauty, and ease of repair is the one that commends itself above all others.

Dr. S. C. G. Watkins. This subject is one of great interest to all of us. Dr. Van Woert spoke of the fitting of bands, and the inference would be drawn from his remarks that it was a very common thing to see bands well fitted, and an uncommon thing to see poor work. I should take the opposite ground. It seems to me that the majority of bands are fitted miserably. We see much of careless, slovenly work in crown- and bridge-work. Either men ought not to attempt it, or else they should qualify themselves specially for it. In Dr. Case's paper, he refers to the cutting down of teeth only half-way, and leaving free surfaces which are easily cleansed. That, I think, is an excellent idea. I have not practiced it, but when I read Dr. Case's paper it struck me as being a most excellent point. When a molar, for instance, which is a good sound tooth, is trimmed for the purpose of attaching a crown to it, Dr. Case's idea is to trim the tooth half-way to its neck, so as to get a solid bearing. Then fit the cap on that, and burnish the gold band to make a close joint. It seems to me to be a more practical method than covering the entire tooth with the gold, and taking the chances of having an imperfectly fitting band, under the edge of the gum. In regard to use of hickory forms, as I understand his method, they are used in connection with pure gold, the pure gold being so soft that it would be almost impossible to use it without a form in working it. The gold is so soft that if you attempt to hold it unsupported in the fingers it would be almost impossible to do much with it.

I have learned one thing from the paper, and that is the idea of reducing pure gold to form by burnishing. Such a thought never occurred to me. I thought it could only be expanded. In regard to crown-work, I want to say that I do not believe in banding in crown-work under any circumstances, if it can be avoided. I think a tooth which is crowned without a band is sufficiently strong, providing the root is a good one, and not cut away too much in its preparation, and certainly much less liable to cause after-trouble. I dispense with a band wherever it is possible. I have seen my cases continually for the last ten years, and cases of split roots are rare.

Dr. Case. It is certainly very gratifying to me to hear so many words of commendation and praise of the ideas that I have advanced in my paper, by men of such high standing. In regard to those things which have been said in opposition to the methods, I may say with truth that there always has been, and there will always be, a difference of opinion as to the mode of procedure in regard to every dental operation. It would be very foolish for me to come here with the idea of converting men with certain ideas to distinctly different ways, and I do not expect to do it; but I do believe that the principles I have advanced in this paper will live, and when the profession come to see their importance, they will follow them in proportion as they appreciate the value of perfection and skill in the fine adjustment of artificial to natural parts.

I did not come here with the expectation, nor is my paper written for the purpose of describing complete methods of crowning teeth, and those who have carried this idea in the discussion of it have wandered from the subject. My object in writing that paper was not to bring out any special views of my own, but to enforce so far as possible that which I believed should be enforced: *i.e.*, that the free margin of a band where it extends beneath the gum is the most important and the most neglected part of the whole operation of crown-work, and if by any means the operation can be perfected in this particular, we prevent to that extent irritation and inflammation of the gum, that is now a common occurrence.

The gentlemen have spoken very sanguinely of their successes in crowning in general, and that they rarely found those imperfect conditions that are common with me. The gums above nearly all crowns that have been worn a year or longer that have fallen under my observation are more or less inflamed, and why? Because there is not that perfection of finish that is possible. The object of my paper was to enforce certain ideas that I believe would make it possible for the profession to do better work. Believing that pure gold is better adapted for obtaining a perfect-fitting band than anything else, I insist upon a form, because it is the only way pure gold can be used successfully. One gentleman makes me say that I not only do not believe in making a root conical, but that I believe in making it the other way. I never said anything of the kind; and that I left it flaring, and that I thought so much of burnishing that I left it flaring and burnished it in. I do not object to anybody making a root conical; that is, if it can be done. I often do it myself.

What are the shapes of molars? Do not they have depressions on the side, and if a band is stretched over them, must there not be space in which food and decay will lurk? "They never heard of burnishing a band after a crown was set." Why, gentlemen, that is what we must come to. If a band is not fitted perfectly to the side of the root, it must be fitted to it. My object in using a rigid clasp-metal post, and fitting it closely in the canal, is to prevent a lateral motion of the sides of the band, when it is burnished against the root. If the band is thin enough, and is made of soft enough material, it can be easily burnished after a crown is set, and that is the important thing. In regard to the question of shrinking a band, of which there seems to be some doubt, permit me to repeat: If a pure gold band is too large for the root of a tooth, simply file down the wooden form so that it slips loosely upon it, and then grasp it in the manner I have endeavored to describe, and you can reduce that band to perfectly fit the form and the root. There is no difficulty in it. If you burnish gold in the ordinary way you spread it; but you can as surely draw the molecules of unburnished gold together as drive them apart if you manage properly. You can do that also, after the cap has been soldered on.

I have not gone into the details of general crown-work, or raised the question of differences of methods in general. I hoped to get an expression upon one particular portion of the work. Not a question of whether it is the best plan to crown teeth with or without bands; but in an actual case of constructing a band extension to a crown, how can it best be made in order to obtain that perfection of finish at the margin and in all parts where it comes in contact with sensitive living tissue, so necessary to prevent those abnormal conditions that are now altogether too common?

THIRD SESSION, TUESDAY EVENING, JANUARY 19, 1892.

The meeting was called to order at eight o'clock P.M.

Dr. Norman W. Kingsley read a paper, with illustrations in plaster casts, entitled "Adenoid Growths, Mouth-Breathing, and Thumb-Sucking in their Relation to Deformities of the Jaw and Irregular Teeth."*

Discussion.

Dr. C. N. Peirce, at the request of Dr. Kingsley, opened the discussion.

Dr. Peirce. I can assure you it is with the greatest reluctance that I have consented to accede to my friend's request, for the reason that I am not competent to speak on this subject—that is, in the line that he desires, of the etiology of this condition of the teeth, which has been so beautifully described in the paper and in the representations which we have had set before us this evening. They have been intensely interesting, and the fact of having to speak upon them mars the pleasure I have had in listening to the description of them.

The human family has through many generations of use established the articulation and the arrangement of the teeth, and it is so established because it is a condition that is most favorable for their function. I maintain that nature is always working for just that condition which gives us the best results with the least amount of force.

We recognize as the normal condition of articulation and arrangement just that condition which nature has acquired by years of habit; acquired, too, because it gives us, as I have just said, the best results,

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*See DENTAL COSMOS for January, p. 16; February, p. 100, *et seq.*

with the least amount of force and friction. Now, with the human family, as with other animals, when a variation occurs which is a disadvantage or a disturbance of function, one interested looks back to discover, if possible, the cause of this deviation from normality, whether recent or remote in origin ; so, when a gentleman comes before us and shows us such an exhibition as we have had this evening, of abnormal conditions, we naturally ask the question, What has been the cause of this break ?

There is always, in every generation, a tendency to variation. But, when a condition has been established through a long line of succession, that variation is usually limited, and we expect some marked cause for it when it becomes a monstrosity.

To specialize in this instance, for which task I feel very incompetent indeed, he gives us a case where the deciduous teeth were not irregular, but the permanent teeth were out of place materially, the upper jaw protruding, and asks. if the permanent teeth were irregular in consequence of adenoid growths and mouth-breathing, why were not the deciduous teeth likewise affected ? I answer, because the deciduous teeth were all in place or had their position established before birth, and the irregularity of the permanent teeth was due to the influence of subsequent conditions, conditions which show an interference with nutrition and other animal functions, and with that interference we have a local condition of adenoid growths ; and I contend that the presence of these growths, in this case, was sufficient to interfere with the air-passages, and so obstruct that method of breathing in which the human family has indulged for thousands of years ; and we have, either as a concomitant or contingent variation, irregularity in position of the permanent teeth.

The first variation noticeable was the adenoid growth ; the second was the interference with breathing ; and the third was abnormal tooth position, which was, as stated, concomitant or contingent. I do not say which, only the fact must be recognized that behind it all there is a systemic condition probably inherited—the expression of some previous factor.

Dr. Peirce then took up the second illustration, his remarks tending to the conclusion that these irregularities were due to natural causes, and were not accidental ; for instance, the prognathous jaw and additional teeth were a reversion to an ancestral type, through probably an arrest or an excess of development by diversion of nutrition and disturbance of other life-functions.

Dr. Charles J. Essig. I do not think that adenoid hypertrophy is caused by mouth-breathing, or that high vaults, narrow arch, protruding incisors, are caused by mouth-breathing ; nearly always, in those cases, I have found low vitality. Wherever sphincter muscles fail to fully perform their function, a deviation from a normal condition may be expected. In one of the very artistic models that Dr. Kingsley exhibits, we observe a short upper lip, and one that has the usual flaccid appearance that I have noticed ; and you will find where the lip is short, where the muscle does not seem to have sufficient contractile power, that the teeth protrude, and very often we find, to make matters worse, that the patient will soon find it convenient and comfortable to fold the lower lip and curl it under the upper teeth, by which means the deformity is increased. Very often the mouth-breathing is really occasioned by the irregularity. The child finds it almost impossible to get the lips together. It would be a matter of constant effort, and naturally the child shrinks from the effort, and involuntarily falls into the most convenient way. The mouth is open, and breathing, as a natural consequence, occurs through it. I have noticed that where the irregularity was corrected, mouth-breathing soon ceased. Undoubtedly habitual mouth-breathing would take away the pressure of the lip in front, and the upper teeth would protrude. I believe the position of the teeth in the arch is governed by the forces by which it is surrounded. It has the tongue on the inside and the lips on the outside. If the tongue be an abnormally large one, we would have protrusions of the teeth ; and if the lip be a short one, there is nothing to restrain the outward protrusion of the teeth. There is another cause of protrusion of the upper teeth that I have noticed, and that is, when there is inherent weakness in the outer alveolar plate that will allow the teeth to project. I have in my mind a family in which nearly every member has protruding upper teeth, and this increases as they grow older. I had on one occasion to extract the four incisors of a lady who was afflicted with this form of progressive protrusion which eventually interfered with clear enunciation. These teeth were perfectly sound, and were reset on a gold plate, the positions having been corrected in that way. In every member in that family this has occurred. Every member of the family has lost teeth by pyorrhea alveolaris, and in the case of the lady alluded to I found the teeth getting very loose, and there was a marked atrophy of the alveoli.

I have wondered whether the thumb-sucking habit had anything to do with the protrusion of the second teeth. It is quite likely that the second teeth will move more readily than the deciduous ones, because the deciduous teeth are developed and pretty well in their places before the child contracts the habit of thumb-sucking. It would be interesting to know just when that habit commences. The deciduous teeth are short, and are firmly fixed in their sockets. At the same time, when they have been lost and the permanent teeth make their appearance, the gums become very vascular. The parts are plastic, and the teeth will move very readily. Usually, when the second teeth are coming, and the attention of the parent is called to the irregularity, and the parents are questioned as to whether the child has contracted the habit, they will make the child wear a thick woolen mit, and do everything they can to prevent it ; but it is quite likely that the little hand will gain its liberty, and go to the mouth ; and the habit is often kept up until the fourteenth or fifteenth year.

I have seen cases which have not been treated, and have found that as the patient advances in years, the irregularity, instead of getting worse, seems to improve, and is not as bad at the age of twenty as it threatened to be at the age of ten.

In regard to the treatment of these cases, I was much interested in Dr. Kingsley's description of his method, and many of the features were entirely new to me. In the case of "jumping the bite" the method is the best one that could be employed. It is wonderful what can be done with the dental arch under pressure. In jumping the bite, as he expresses it, which is simply to correct an abnormal bite the first lower bicuspid, as I understand it, was situated between the first and second upper bicuspids, in that way [illustrating] ; whereas he threw back the upper jaw so as to make the bite normal, and make the first inferior bicuspid break joints with the superior cuspid and first bicuspid in the way I show you on the board. Nothing could better correct it. My own method of treating irregularities of this kind is, however, different. The way I have treated those cases myself was to remove the first bicuspid, and then bring pressure to bear on the six anterior teeth until the cuspid and second bicuspid were made to touch each other, thus taking up the space left by the extraction of the first bicuspid. Now we make two rubber caps, fitting upon the bicuspid and first molar, with a bar of gold attached running around outside of the front teeth. The bar may be attached to one of the caps, but with the second one it may be fixed with the screw, either a screw in the cap itself, or else the bar may run through a cylinder fixed in one of the caps and the tightening accomplished gradually by means of a nut. It is necessary to strengthen the cap by arranging a piece of gold to fit over the teeth and imbed that in the rubber. Sometimes these irregularities are produced by a shortness of the bicuspids. Now, I have sometimes succeeded in treating those cases by making a cap to fit over the bicuspid and molar, with a piece of gold in it, so as to prevent it from splitting when the child bites upon it. These caps should not cover the second molars, as in treatment of such cases it is desirable to encourage lengthening of the second molars. One of these caps should have a gold cylinder on the outside with a thread in it, and a bar with a screw to fit in the cylinder. You can produce sufficient pressure to bring those spaces almost together, and then it will only be necessary to use a retaining plate, and this same fixture can be employed for that purpose for a sufficient length of time.

In the mean time the cap has been made to fit upon the first molar and the second bicuspid, but the second molars are uncovered, and the idea is to have them lengthen and relieve the outward pressure of the inferior centrals on the necks of the superior incisors.

Dr. S. H. Guilford. The paper has not only been exceedingly interesting, but to me it has been very instructive, and I cannot help but admire the artistic skill which the essayist has displayed in illustrating it, not only with the appliances, but especially with the casts. I have never seen a paper so well or so effectively illustrated. I envy his ability in that direction. The essayist deals with three conditions that are very clearly stated in the title. The one is adenoid growths, which is a pathological condition, and the other two are what might be denominated evil habits,—the one mouth-breathing, and the other thumb-sucking. In regard to adenoid growths, very little attention has been paid to them in dental literature. The subject has generally been relegated to the physicians, who have treated it from their own standpoint ; but when they consider the condition in its relation to dentistry, they fall into error. Adenoid vegetations are growths situated in the posterior nares, and interfere, sometimes very much, with the natural method of breathing through the nose ; and inasmuch as by such obstruction they cause the patient to breathe through the mouth, they are of interest to us as dentists.

My experience has led me to coincide with the views that have been put forth by the essayist. Aside from their interference with breathing, adenoid growths are not found to work injury to the dental organs, and if that be so, we may ask, How is mouth-breathing injurious?

Whenever anything new is brought forward which on a superficial view seems likely to affect a condition that we are considering, many are very apt to jump at conclusions. In reading over a paper on adenoid growths by Dr. Hooper, of Boston, and also in noticing what was said by one of your New York surgeons (Dr. Delavan) in a paper read before this society, or the Odontological, in which he speaks of the way in which adenoid growths affect the dental organs, I was surprised to see what views were put forth. They state that adenoid growths stop the breathing through the nose; cause the patient to breathe through the mouth; and that in breathing through the mouth, pressure is brought to bear on the arches and causes them to contract. That is a very bold statement, and at first glance seems plausible, but we find that it is not true, and Dr. Talbot has very thoroughly elucidated the matter in a paper that he read before the American Dental Association last August.

The only muscle that is affected in mouth-breathing is the buccinator. Its upper attachment is considerably above and entirely independent of the alveolar process, while its lower attachment is to the body of the inferior maxilla, near its lower edge. The muscle being attached in this manner does not touch the alveolar arch, even when the mouth is held open. When a patient is a mouth-breather, the mouth is only opened sufficiently to allow a normal amount of air to pass into the lungs, and this does not cause any perceptible contraction of the buccinator muscle; but if it did, it could do no harm. I was surprised to-night to find that my friend, Professor Peirce, had fallen into the same error, which a little careful thought would have kept him free from. I think that mouth-breathing is injurious in some ways, but not in the way of producing contraction of the arch.

There is one way, which has not been alluded to, in which mouth-breathing may seriously affect the dental organs. When a tooth is no longer in occlusion, say a molar or bicuspid in the upper or lower jaw which fails to meet its antagonist, it becomes elongated, and we speak of this as being an effort on the part of Nature to remove a superfluous organ. When the teeth are formed, and while they are erupting, as the roots become longer the alveolar process is built up around them, and when they have attained their full growth and come into occlusion with those of the opposite jaw, the process of bone-formation ceases, because there is no longer any need of it. When, however, occlusion is destroyed, we notice that elongation begins. What is the cause of this? I think it is nothing more than a continuance of the process that has been going on previously, and when the mouth is held open habitually, there being no antagonism, opportunity is afforded the teeth to elongate, which they very often do. In some of the cases, as the first one mentioned by Dr. Kingsley, he says he is at a loss to know why the anterior teeth did not antagonize. I think it is due to elongation of the posterior teeth, indirectly induced by mouth-breathing. Why the back teeth should become elongated in such cases and not the front, I am unable to say. Where we see the peculiar condition of non-occlusion of the anterior teeth, I think it is caused in nearly every case by the elongation of the posterior teeth, brought about possibly by breathing through the mouth.

One other illustration : In one of the other cases Dr. Kingsley speaks of the fact that the lower incisors stood abnormally above the line. What caused those teeth to stand so high ? Have you ever seen the incisors in the lower jaw standing higher than their fellows, when they occluded with the opposing teeth ? I never have. They have become elongated through lack of antagonism, and we have the same process repeated there that we had, as I said a moment ago, in the lower molars. The teeth are lifted up by an extra formation of the alveolar process at their bases until they come in contact with something which checks their progress, and then the process stops ; so I can see no evil results of mouth-breathing except the opportunity it affords for extra development of alveolar tissue and the consequent elongation of some of the teeth.

In thumb-sucking we do have trouble. We see deformities of the jaw resulting from it, but not as frequently as we might suppose. In very many cases the habit is not followed by any evil results, and yet sometimes it is. One of the worst cases of thumb-sucking I ever knew of was that of a friend of my boyhood days. He persisted in the habit until he was about twelve years of age, and yet the form of his dental arches and the occlusion of his teeth are about as perfect as you ever find. I took an impression of his teeth yesterday, and have brought the models with me. They prove that even long persistence in the habit may not be followed by any deleterious results.

As to the cases presented to-night, I would state that I have nothing to say relative to the mechanical management of them. I have to admire the manner in which Dr. Kingsley's appliances were constructed, and the correct principles upon which they were based.

One thing more I want to allude to : In considering the matter of irregularities or of their correction, we are apt to look upon Nature as the enemy of our work. We feel sometimes that in correcting irregularities, we have to work against Nature. Nature, however, is our best friend. In our efforts we are not antagonized by her forces, but always helped. Dr. Kingsley has spoken of certain changes taking place that he did not expect. How were they brought about ? It was nothing more than the tendency of Nature toward harmony. All that we do in the proper direction will be seconded by Nature's forces.

Dr. Geo. F. Eames. I have been exceedingly interested in Dr. Kingsley's paper, which has been most admirably illustrated in a novel way. That portion which interested me most related to adenoid growths and mouth-breathing, and in the discussions following the paper there is much that provokes still further discussion, showing at the same time the absence of a common ground between the physician and the dentist. The physician's view of the situation extends but little beyond the outskirts of the dental field ; and the dentist, on the other hand, has but a limited view of the field of medicine ; consequently neither the dentist nor the physician has been correctly represented in the discussion here this evening. It is desirable, of course, that a reconciliation of ideas be effected.

Results have been spoken of as *causes*. We must look further for the cause,—back of the mouth-breathing, back of deformed arches, and back of the adenoid growths ; but at this late hour an extended discussion would be unreasonable.

I can only say that, according to my observations, a large adenoid growth may be accompanied by a *low* arch, that it rarely interferes with the breathing primarily, that mouth-breathing *may* be the result of other causes than an enlarged pharyngeal tonsil.

I shall hope to express my views more fully at some future time through the dental journals.

(To be continued.)

SOUTHERN DENTAL ASSOCIATION.

(Concluded from page 234.)

THIRD DAY—*Morning Session* (Continued).

THE Committee on Literature and Voluntary Essays was called, and Dr. Crawford, its acting chairman, read a paper written by himself, entitled "The Care of Children's Teeth." An abstract follows :

The care of the teeth of children is to-day the most important question that addresses itself to the American people. The almost universal presence of disease in the mouths of children is a startling fact which appeals to all who give health and hygiene any attention whatever. That human teeth in this country are becoming more susceptible to decay and other diseases is attributable more to want of function than to any other one thing, and many affections of the teeth are more virulent and rapid in the processes of destruction than they used to be. From want of functional activity the roots of teeth are tardy in their development, so that in many cases extensive decay supervenes before the apical foramen has been closed. The writer felt certain that the presence of large cavities of decay does retard the proper development of the roots, just as the presence of large cavities, especially when filled with amalgam, retards the normal absorption of the roots of the deciduous teeth.

For the protection of children's teeth he would lay down these rules :

The eruption of the deciduous teeth should be superintended by a competent dentist ; in infantile troubles of doubtful diagnosis a dental expert should be called to determine whether dental irritation is a serious factor ; after the eruption of the temporary teeth—usually completed about the twenty-fourth month—they should be examined from one to four times a year, depending on the physiological make-up of the child, and such attention given as may be required ; no child should be allowed to enter the period of eruption of the permanent teeth with caries preying upon the temporary set ; and the removal of the deciduous teeth should be conducted by a skillful dentist and be accomplished in pairs.

For the treatment of incipient caries in children's teeth he recommended merely the thorough removal of the diseased portion ; in more advanced cases the decay should be carefully removed, the cavities carefully prepared, and filled with cement, the fillings to be renewed as often as necessary to keep the teeth in good sanitary condition. Where the teeth have been neglected until the child presents with one or more dead teeth, any abscesses or sinuses should be treated, and the teeth filled and ground down until completely non-antagonized, so that the non-absorption of their roots should be supplemented by the process of exfoliation. In this connection, the writer noted the clinical fact that in case of abscess from death of the pulp of a deciduous tooth the permanent tooth erupts earlier, as a rule, than nature intended.

The care of the deciduous teeth has not received the attention which the importance of the subject demands. If dentistry ever accomplishes the good it is capable of accomplishing for humanity, this department of practice must be more closely attended to. That at least ninety-five per cent. of the school children are affected with dental caries bodes more evil to the American people, from the health standpoint, than any other fact. The fathers and mothers are more derelict in their duty in regard to the care of their children's teeth than in any other particular, and Dr. Crawford believed that this dereliction was largely responsible for the large death-rate of children in this country.

The paper concluded with a protest against the habit of eating between meals, especially of the candies and sweetmeats found on the little fruit-stands at street corners and elsewhere, such places being in his estimation a greater menace to public health and welfare than the much-abused whisky traffic.

Dr. Milam. If the teeth of a child four years old are filled with amalgam,—let it be a molar or bicuspid, he had never tried the incisors,—absorption of the roots would cease ; at least, when extracted, the roots seem as long as ever. He extracted teeth for children at the proper time, whether they ached or not, and believed that by so doing he saved a good many others ; but having observed in many cases that from some cause deciduous teeth filled with amalgam did not have their roots absorbed in the natural way, he had come to the conclusion that if the deciduous teeth were to be left to be removed by absorption, they had better not be filled with amalgam.

Dr. D. D. Lester, Christiansburgh, Va., was in the habit of filling his children's teeth with amalgam, in one instance having filled the first molar in his little girl's mouth with amalgam at two years of age. The root of that tooth was the most completely absorbed that he had ever seen. The tooth was not extracted, but just dropped out of the mouth, and there wasn't a sign of a root there, though the tooth had a large amount of filling in it.

Dr. Poole, while indorsing the paper generally, did not think an amalgam filling an injury to a temporary tooth. A great many dentists make it a rule not to extract the temporary teeth at all. The only rigid rule he had on that point was not to extract the deciduous molars until the sixth-year molar was in place, to prevent its going forward and crowding the other teeth. He considered it very important to save the second deciduous molar, at least until the permanent molar was erupted.

Dr. Milam made it a rule never to fill children's teeth with gold until they are fourteen or fifteen years of age, for the reason that he formerly had more or less signal failures in trying to save such teeth with gold. He was in the habit of keeping the teeth of such patients filled with cement for five, six, or seven years, and he would not put a gold filling in a child's tooth.

Dr. Beach. One of the most distressing things is to see children crying with toothache without an effort being made to relieve their suffering. The subject of the care of the teeth of children is of the highest importance. The paper by Dr. Crawford is excellent in most of its ideas, though he could not agree with it in all things. One of these was that when deciduous teeth were filled with amalgam the absorption of their roots was retarded. He did not believe that, and yet he did not know that it was not so; nor did he know that Dr. Crawford believed it *in toto;* he had seen enough to convince him that it was sometimes the case and that there was a possibility of its being of almost universal occurrence. One gentleman says the most complete absorption was in the roots of a tooth which had been filled with amalgam. That was evidence that the influence referred to was not universal. After a long experience in the care of children's teeth, he stated that the best treatment he had ever known was, when decay first made its appearance to remove it, with sand-paper or anything else that can be used, leaving the teeth in a polished condition, when they would rarely, if ever, either decay to the extent that they could not be filled or give further trouble until nature required their removal. Deciduous molars, when decayed on the approximal surfaces, may be treated in the same manner, though he preferred to fill these. He should fill them with amalgam, and from this time on he should take note as to the effect and especially as to the absorption of the roots. He did not want the members of this association to tell parents to let the baby teeth alone. Many dentists dislike to handle children; they are cross, fearful of being hurt, and they cry a good deal; but when properly trained they will submit to an operation and surprise you with the fortitude with which they will bear pain. They will cry out, but they will open their mouths and let you go ahead and finish the operation. If you have never undertaken to fill children's teeth, begin when you go home.

On motion of Dr. Beadles, the discussion was suspended to take up the subject of the proposed permanent home for the association.

Dr. W. H. Richards, Knoxville, as chairman of the committee having the matter in charge, reported that several locations had been suggested,—Monteagle, in Middle Tennessee; Lookout Mountain; Linnville, N. C.; and Harrogate, Tenn. The committee recommended that the association should meet next year at Harrogate, which is a suburb of Middlesborough, Ky. For the benefit of those who were unacquainted with the project, he explained that the idea was to have a permanent place of meeting, where they could have all the appliances necessary for the demonstration of any operation: in other words, to found a dental Chautauqua, where they could have, if they chose, a thirty days' meeting each year. The location at Harrogate, right at the Cumberland Gap, is one of the most wholesome in the United States; it is also central, and steps are being taken to make the car service surpass anything in the United States for invalids.

The subject was further discussed by Drs. Crawford, Milam, Catching, Richards, Beach, Wright, H. W. Morgan, Turner, Johnston, and B. Holly Smith.

Dr. Crawford, in the course of his remarks, urged upon his hearers the necessity of supporting, by every means in their power, the Columbian Dental Congress to be held in Chicago, in 1893.

The following resolution, offered by Dr. Beach, was adopted :

Resolved, That the committee on the location of our home be continued, and that the place of location be decided upon at our next annual meeting.

Adjourned to to-morrow morning.

The evening was devoted to social enjoyments. A sail over the inlet and a dip into the surf refreshed both mind and body. Later a banquet, tendered by the North Carolina Dental Association to the members of the Southern Dental Association, was held in the dining hall of the Atlantic Hotel.

FOURTH DAY—*Morning Session.*

The association was called to order at 10 A.M., President Wright in the chair.

The Committee on Prosthetic Dentistry was called, and its chairman, Dr. C. L. Alexander, of Charlotte, N. C., reported that no papers had been presented to the committee.

Dr. J. S. Thompson, Atlanta. The tendency in prosthetic dentistry is toward the use, wherever possible, of artificial substitutes which do not cover the roof of the mouth, as in bridge-work. Where the bridge-work is removable, the patient can keep it thoroughly cleansed. The speaker had been experimenting in this direction of doing away with the covering of the roof of the mouth in pieces containing from one to five or six teeth, by the use of a spring plate, with a good deal of satisfaction. In cases where, for instance, the second bicuspid is badly decayed, with the first molar on the same side decayed on the two approximal surfaces and the second molar also decayed on the anterior approximal surface, he has adopted the plan of cutting away the crown of the first molar, which gives perfect access to the cavities in the other two teeth, which are then filled and a crown placed on the tooth which was cut away. His idea is that the operation can be performed in less time, the fillings can be inserted more accurately, and the crown is a more certain protection for the first molar than the large compound filling which would be necessary.

Dr. Richards has been using the Clark deposit-plate, having inserted probably seventy-five of them, with success, as they fit accurately. The only possible objection is that the gold may rub off, but he overcomes this by paying a little extra for extra gold deposit, which makes it very nice. Some three or four have broken, but in these cases the fault was his own, not that of the plate.

A voluntary paper by Dr. C. B. Colson, Charleston, S. C., entitled "Differences in Medical and Dental Therapeutics that Cause Friction, and Suggestions to Harmonize them," was read by Dr. Herring. Discussing the injuries done to the teeth by certain medicinal agents, the writer acknowledged the value of these agents, and attributed the difficulties caused by them to improper methods of administration. The text-books and works of reference are silent upon the subject, to which fact is due the lack of knowledge on the part of the physician. The old way of administering tincture of chloride of iron through a tube is poor, as invariably sufficient acid finds its way into the mouth to do injury. When given in a spoon or wine-glass it still does its work, doing more harm when diluted than when pure. Lime-water is positively no good, as it cannot be mixed with the tincture, or it would destroy it, and when administered after the iron preparation it does not prevent the free acid from acting on the teeth, as the acid action is instantaneous. But there are really antidotes to injurious results from the administration of this tincture. Any of the alkaline carbonated waters will counteract it ; the best is Vichy, the next Seltzer. Tincture of chloride of iron is improved by the addition of Vichy, and the addition entirely protects the teeth. Dr. G. W. Weld read an admirable paper on this subject before the New York Odontological Society last May, in which he said that he had "discovered that this astringent and acid preparation can be administered in Vichy, or any similar alkaline water, without the slightest ill consequences to the teeth ; and that the iron when so administered becomes, by the elimination of the free hydrochloric acid, a stronger restorative agent, and is more likely to be assimilated and tolerated by a weak stomach." The writer has been using Vichy in this way for ten years, having gained his information from a French medical work.

The best way would be to strive to get physicians to prescribe and the druggists to place on the labels, "This preparation is injurious to the teeth unless taken with Vichy or Seltzer water." French Vichy, however, shortly after it is opened loses its carbonic acid, a very important property, as the gas helps to hold the chloride of iron in solution, prevents the alkaline salts from acting on the iron, and, again, assists in a mechanical way in preventing the contact of any free acid with the teeth. The most practical and most economical way to use this medium is by purchasing the salts of Vichy, and making a solution of a quarter of a teaspoonful in three ounces of water, which gives a sure medium for the iron and a preservative for the teeth.

Sulphuric acid is far more injurious than hydrochloric. It has not the bad name of the iron chloride, for it bleaches the teeth instead of forming black nodules, and nothing is given with it to counteract its effects. For this he would recommend rinsing the mouth out with pure lime-water, taking the acid through a glass tube, and immediately rinsing out again with lime-water, and again with plain drinking water.

Acetic acid is not now generally used as a medicine, but enormous quantities of it are consumed in beverages. Although not so powerful in its action as the others mentioned, it is used so commonly that the writer believes it does more harm to the general public than the other two. Most fruit syrups contain it in large quantity. Calomel is another drug which does fearful injury through salivation, and thus shortens the lives of patients. For these the paper gave no antidote, but urged the importance of dentists, who see the effects, investigating their causes and the methods of prevention, and then communicating their conclusions to the harmonization of medical therapeutics and dental knowledge.

The report of the Committee on Appliances and Improvements was then presented by Dr. Henry W. Morgan, in the absence of the chairman, Dr. J. Rollo Knapp. The report stated that it had occurred to the chairman of the committee that an exhibit of the new appliances and improvements in dentistry would be an attractive feature of the meeting ; and the president having approved the idea, the co-operation of the various manufacturers of dentists' supplies had been solicited, with the gratifying result shown in the room devoted to the exhibit.

The S. S. White Dental Mfg. Co. exhibited crystal mat gold; gold plates and solders; machine-made engine-burs; the S. S. White side-wheel engines, the Weber-Perry engine; the Knapp blow-pipe with carburetter; the Kells electrical system for incandescent circuit; electric mallet, electric lathe, electric fan, electric mouth-lamp, electric laryngoscope, electric cautery, Partz gravity batteries, storage batteries, etc.; crown- and bridge-work appliances; Head's ideal dental base-plate; "Splendid" alloy; new molds of porcelain teeth; a new gasometer; Evans's improved root-drier; Evans's new set of root-trimmers; bench block, absorbent cotton rolls; child's seat for Wilkerson chair; Allan table in sections, showing its construction; diamond disks, wheels, points, drills, and trephines; "Flexo" files, saws, and strips; chloride of ethyl; Japanese bibulous paper in boxes; Watling pliers; porcelain inlay rods; Melotte's crown-dies; Kells bracket arm for dental engine; plate shears for crown- and bridge-workers; flexible steel scratch brushes; How's root-canal instruments; cup-shape corundum disks; "Matchless" blow-pipe; Mayr's test-papers; crown articulator; Littleton's root-canal drills; porte polisher and porte sponge; and the following standard appliances: Wilkerson dental chair, Morrison dental chair, fountain spittoon, Johnston dental engine, mechanical mallets for dental engines, Abbott's automatic mallet, long-handle instruments, Darby-Perry instruments, Arrington's amalgam, Lawrence's amalgam, Weston's insoluble cement, Baldwin's hydraulic cement, glass mixing tablet, Walker's granular gum facing, and The S. S. White Dental Mfg. Co.'s pink rubber.

The following were other exhibits: Richmond hand-piece, Moffit's anatomical articulator, Faught's electric gutta-percha heater, Nye's plastic gold, Eureka dam-holder, Rynear gold crowns and pliers, Calvert's dental engine pulley-head, removable pin crown, Teague's cavity cap disk, Chase metallic roof plate and molding sand, and the Hatch clamp.

The discussion of prosthetic dentistry was resumed, and in response to a request Dr. W. H. Marshall, Oxford, Miss., described in detail the making of his anchor denture.

[Dr. Marshall stated that he had taken out a patent on the method, but he wished to present its use to the members of the Southern Dental Association. If the secretary would furnish him the names and addresses, he would send the licenses for the entire term of the patent properly executed.]

Dr. Beach felt greatly obliged for the demonstration, which alone would repay any dentist who had heard it. He wished particularly to emphasize the need, in making an artificial denture, of leaving the teeth and band intact upon the model, as there would then be no trouble about the fitting of the plate. He would use wax to attach the teeth, and he would scald it out with hot water, which would not disturb the teeth, one of the most important essentials in the adaptation of the plate.

Dr. Alexander desired to speak of a crown made of amalgam and gold, of which he had made a number, which had been used for a year without failing. He uses copper amalgam, with as little mercury as possible.

Dr. Beach thought the use of amalgam and gold combined, likely to result unfortunately. It would be better, in his opinion, to use Wood's old filling-material in place of the amalgam.

The subject of prosthetic dentistry was passed.

Votes of thanks to the North Carolina Dental Association and to the Atlantic Hotel Company for courtesies extended, and to the North Carolina Teachers' Assembly for the use of their hall, were unanimously adopted.

The Committee on Necrology reported suitable resolutions on the deaths of Drs. Edward Maynard, W. H. Atkinson, James W. White, O. J. Bond, and J. R. Smith, which were adopted after eulogies of the various dead were pronounced by Mr. J. W. Selby, and by Drs. Milam, Morgan, Crawford, Smith, Wardlaw, James Johnston, Turner, E. L. Hunter, Wright, and Quattlebaum.

Adjourned to 3.30 P.M.

Afternoon Session.

The association met pursuant to adjournment, President Wright in the chair.

Dr. Gordon White, by request, described an experience in sponge-grafting. As far back as 1885 he had practiced for the cure of alveolar abscess extensive amputation of roots, frequently cutting away from one-third to two-thirds of their length, and he had yet to learn of a single failure. The only objection to the practice he had found was that after healing there was a little depression of the gum which offered a lodgment to foreign matters and caused more or less irritation from time to time. At the suggestion of the late Dr. Atkinson, he tried sponge-grafting to overcome this. The root of the tooth was excised, the diseased bone removed, and the stump smoothed up. The wound was then thoroughly washed with sterilized tepid water, and the sponge, which was trimmed to approximately fit the cavity, was introduced, and the gum allowed to close over it. At first there was a little swelling, and the extruded end of the sponge had to be clipped off with scissors twice, but at the end of a month the cavity was almost filled with elastic tissue. At the end of the second month the cavity was entirely filled, leaving little outward sign of the operation. The tooth was as tight in its socket as any other, the only indication of the operation being a red spot about the size of a pinhead.

Dr. Gordon White, chairman of the Clinic Committee, reported the following operations as having been performed: Dr. J. T. Calvert, Spartanburg, S. C., combination gold and porcelain crown for right superior central, demonstrating also the use of his double pulley-head for running one or more cables. Dr. E. P. Beadles, Danville, Va., compound filling of anterior and grinding-surface of left superior first molar with cohesive gold, condensed by hand-pressure, using the mouth-mirror throughout. Dr. J. Y. Crawford, Nashville, Tenn., oral clinics. Dr. S. P. Hilliard, Rocky Mount, N. C., filling large cavity in grinding-surface of right lower first molar with Nye's plastic gold, condensed with mallet. Dr. Henry W. Morgan, Nashville, Tenn., compound filling of anterior and grinding-surfaces of right superior molar, using non-cohesive gold at cervical walls, and condensing with hand and Bonwill mechanical mallet for engine. Dr.

Frank Boyette, Clinton, N. C., approximal contour filling in right superior central incisor, with cohesive gold, condensed by hand-pressure and mallet. Dr. J. B. Patrick, Charleston, S. C., filling root-canal with wood point wrapped with tin foil, sterilizing with creasote. Dr. G. B. Patterson, Fayetteville, N. C., demonstration of Dr. C. Sill's method of filling over sensitive dentine or exposed pulps with oxyphosphate of zinc, incorporated with vaselin in the proportion of 15 of the former to 1 of the latter. Dr. J. Rollo Knapp, New Orleans, extensive bridge-work consisting of twenty teeth on five separate bridges, the bridges having been made in his office and adjusted temporarily so that they might be removed for examination and the principles involved in their construction explained. Dr. W. H. Marshall, Oxford, Miss., removable denture of seven teeth on rubber, anchored by gold bands to gold crowns and so adjusted that all pressure is upon the gums.

The report was adopted.

The election of officers for the next year was held, resulting as reported in the DENTAL COSMOS for September, 1891.

The executive committee was authorized, on motion of Dr. Beach, to change the place of meeting to Lookout Mountain, in case sufficient hotel accommodation could not be obtained at Harrogate.

On motion of Dr. Beach, a resolution of thanks to The S. S. White Dental Mfg. Co. for their courtesies at this meeting, and also to the other manufacturers and dealers who have had exhibits here for the accommodation of the dentists, was adopted.

The newly-elected officers were installed, and on motion of Dr. Crawford the secretary was instructed to present a formal invitation to the officers of the Columbian Dental Congress to meet with the association next year.

Adjourned to meet at Harrogate, Tenn., Tuesday, July 26, 1892.

HARVARD ODONTOLOGICAL SOCIETY.

THE fourteenth annual meeting of the Harvard Odontological Society was held at Young's Hotel, Boston, Feb. 27, 1892; the president, Dr. Jere. E. Stanton, of Boston, in the chair.

Previous to the dinner, the regular business of the organization was transacted, and the following-named officers were elected for the ensuing year: Jere. E. Stanton, M.D., D.M.D., Boston, president; Waldo E. Boardman, D.M.D., Boston, recording secretary; Charles H. Taft, A.B., D.M.D., Cambridge, corresponding secretary; Dwight M. Clapp, D.M.D., Boston, treasurer; Henry L. Upham, D.M.D., Boston, editor; Eugene H. Smith, D.M.D., Boston, annual orator; Waldo E. Boardman, D.M D., Boston, W. E. Page, D.M.D., Boston, H. M. Clifford, D.M.D., Boston, executive committee.

After listening to the annual address delivered by Dr. Henry W. Gillette, of Newport, R. I., the society gave its attention to the report of Dr. Dwight M. Clapp, chairman of the Committee on the Harvard Dental School, who submitted a brief outline of the plans proposed for raising the necessary funds for a new hospital and school building, and of the preliminary work done thus far in the matter by the joint committee of the school and of the faculty.

The remainder of the evening was spent in listening to an abundance of good speeches, and the society enters upon the fifteenth year of its existence in a most prosperous and flourishing condition.

CHARLES H. TAFT, *Corresponding Secretary.*

NEW BRUNSWICK DENTAL SOCIETY.

THE annual meeting of the New Brunswick Dental Society was held in August last in Berryman's Hall, St. John, N. B. The following officers were elected for the ensuing term: Dr. A. T. McAvenney, St. John, N. B., president; Dr. J. W. Sangster, Sackville, N. B., vice-president; Dr. Chas. A. Murray, Moncton, N. B., secretary-treasurer.

The Council of Dental Surgeons of New Brunswick also held its annual meeting on the same date and at the same place. Dr. Chas. A. Murray, of Moncton, was elected president, and Dr. Frank A. Godsoe, secretary and registrar.

The next place and time of meeting of both council and society will be in Moncton, N. B., on the second Tuesday in August, 1892.

FRANK A. GODSOE, D.D.S., *Secretary and Registrar,*
St. John, N. B.

NEW ENGLAND DENTAL SOCIETY.

THE twenty-ninth annual meeting of the New England Dental Society was held in Boston, Mass., October 29 and 30, 1891.

The following were elected officers for the ensuing year: J. F. Adams, president, Worcester, Mass.; S. G. Stevens and J. H. Daly, vice-presidents, Boston, Mass.; Edgar O. Kinsman, secretary, Cambridge, Mass.; J. H. McQuade, assistant secretary, Medford, Mass.; George A. Young, treasurer, Concord, N. H.; A. H. Gilson, librarian, Boston, Mass.; W. E. Page, George F. Cheney, C. H. Hayward, W. P. Cooke, and Marion L. Woodward, executive committee.

EDGAR O. KINSMAN, *Secretary,*
Cambridge, Mass.

ALUMNI SOCIETY OF THE PHILADELPHIA DENTAL COLLEGE.

AT the annual meeting of the Alumni Society of the Philadelphia Dental College, held at the college building February 24, 1892, the following officers were elected for the current year: M. H. Cryer, president; W. A. Capon, first vice-president; Zane B. Taylor, vice-president from class of 1892; L. Greenbaum, recording secretary; S. H. Guilford, corresponding secretary; J. N. Wunderlich, treasurer.

A paper was read by Dr. Maria Lasser upon "Dental Ethics," which was discussed by Drs. Frank L Bassett, Zane B. Taylor, S. H. Guilford, Eliza Yerkes, S. E. Gilbert, James E. Garretson, and others.

L. GREENBAUM, *Recording Secretary.*

DENTAL COLLEGE COMMENCEMENTS.

NEW YORK COLLEGE OF DENTISTRY.

The twenty-sixth annual commencement exercises of the New York College of Dentistry were held at Chickering Hall, New York City, on Thursday evening, March 10, 1892.

The valedictory was delivered by Henry P. King, D.D.S., of the graduating class, and the address to the graduates by William H. McElroy, Esq.

The number of matriculates for the session was two hundred and seventy-three.

The degree of D.D.S. was conferred on the following graduates by William T. LaRoche, D.D.S., vice-president of the board of trustees :

NAME.	STATE OR COUNTRY.
John P. Burke	New York.
Miksa L. Braun	Hungary.
Edward S. Butler	England.
Walter Benney	New York.
Frederick Brueckner	Germany.
Eugene B. y Cuibas	Porto Rico.
James E. Byrne	New York.
Henry E. Bischof	New York.
John F. Buckley	Massachusetts.
Carl R. O. Bickel	Germany.
Albert W. Crosby	Connecticut.
John P. Cromwell	New York.
Edward A. Crostic	New York.
George E. Christie	New Jersey.
Martin L. Collins	Connecticut.
Nelson M. Chitterling	New Jersey.
Louis B. Daboll	Pennsylvania.
Harry C. Derby	New York.
Richard F. Doran	New Jersey.
Anthony C. Durschang	New York.
Joseph Fuld	New York.
H. Clay R. Ferris	New York.
Finn Fosheim	Norway.
Edgar O. Goodell	Massachusetts.
John F. Goger	Germany.
Walter H. Gardner	Connecticut.
William H. Garratt	Canada.
Dexter G. Gordon	New York.
Charles F. Guntner	New York.
Charles C. Gibson	Canada.
Joseph Gluck	Hungary.
Joseph Harvitt	Russia.
John H. Hughes	Canada.
Wm. H. M. Hamlet	New York.
Peter J. Heffern	Massachusetts.
Otto G. Hoffman	New York.
Orion P. Howe	Illinois.
Henry D. Hatch	New York.
Byron E. Joubert	New York.
George W. Koles	New York.
Eli Koles	New York.
Harry T. Kelsay	Maryland.
Isaac Kroch	New York.
Henry P. King	New York.
Henry A. Kregeloh	New Jersey.
Ernest A. Kolling	Sweden.
Frank B. Long	New York.
Frank L. Lockwood	Massachusetts.
Alfred T. Lockwood	California.
W. H. McCutcheon	New York.
Miguil R. Mangual	Porto Rico.
Frank L. Munsell	Massachusetts.
Aug. MacCollom, Jr	New York.
Julius A. Mayer	Connecticut.
Alonzo S. Mead	Connecticut.
Edward W. McNeil	New York.
Frederic T. Murlless, Jr.	Connecticut.
Henry A. Neech	France.
Frederick S. Parsons	Massachusetts.
Henry A. Parmentier	New York.
George E. Reynolds	New York.
George A. Roussel	France.
Samuel Schnaper	New York.
Frank Schroeder	Germany.
Aug. V. Stebbins	New Jersey.
Henry J. Stacpoole	New York.
Jacob Schnaier	New York.
E. Warren Sylla	Illinois.
Henry G. Schroeder	New York.
Edward J. M. Seebold	France.
Engelbert Stoetzer	Pennsylvania.
Mario T. y Polidura	Porto Rico.
Ezra O. Taylor	Utah.
Zebulon S. Taylor	New Jersey.
George Vande Verg	New York.
Orwill Van Wickle	New Jersey.
George P. Willis	New York.
Edwin C. Wallace	New York.
Henry L. Wheeler	Vermont.
Frank J. Woodworth	New Jersey.
Augustine J. Walsh	New Jersey.
Edgar Williams	England.
Willie J. Ward	North Carolina.
Leon J. Weeks	New York.
Harry F. Whitter	Canada.
Floyd M. Zelie	New York.

PHILADELPHIA DENTAL COLLEGE.

THE twenty-ninth annual commencement exercises of the Philadelphia Dental College were held at the American Academy of Music, Philadelphia, Pa., on Thursday, February 25, 1892, at 8 P.M.

The address to the graduates was delivered by Professor S. H. Guilford, D.D.S., Ph.D., and the valedictory address by J. R. Coleman, D.D.S.

The number of matriculates for the session was two hundred and sixty.

The degree of D.D.S. was conferred on the following graduates by Ex-Governor James A. Beaver, president of the board of trustees :

NAME.	STATE OR COUNTRY.
Egerton S. Allen	Nova Scotia.
Courtland J. Allen	Rhode Island.
J. Wilmot Angwin	Canada
H. D. Atkinson	Missouri.
Vincent J. Baggott	Rhode Island.
Adolf Balcke	Germany.
J. D. Ballard	New Jersey.
Wm A. Bartlett, Jr.	Maine.
Howard S. Bath	Canada.
J. A. Baumgardt	Germany.
Frank G. Bedell	New York.
Fred. W. Benz	New York.
Neil H. Bishop	Ohio.
John A. Blackett	Australia.
S. J. Bourgeois	Louisiana.
D. L. Bower	Pennsylvania.
Arthur M. Bowman	New York.
Gertrude A. Bright	England.
Joseph Brooks	Canada.
E. D. Butterworth	New York.
Frank J. Bush	New York.
Hugh F. Calder	Nova Scotia.
Charles Cameron	Canada.
E. E. Cawood	Oregon.
Arthur J. Chilcott	Maine.
John A. Clarke	Canada.
J. Edwin Clark	Pennsylvania.
J R. Coleman	Canada.
Edward B. Cottrell	New Jersey.
Oscar B. Crawford	Pennsylvania.
Robert Crawford	Australia.
W. B. Cresswell	Pennsylvania.
J. Maurice Crosby	Canada.
William A. Crow	Canada.
Wm. N. Daniels	Massachusetts.
Jacques S. David	Roumania.
Wm. F. Dohrmann	California.
R. E. Duignan	New York.
L. F. Eaton	Connecticut.
Elma H. Edgar	New York.
David L. Edwards	New York.
Frank A. Elson	Ohio.
Edmund P. Ennis	Canada.
H. H. Erskine	Ohio.
Deering J. Fisher	Rhode Island.
C. E. Fletcher	Missouri.
Charles A. Frain	Canada.
Carlos F. Fuentes	Chili.
Edwin R Gamble	Pennsylvania.
Alexander J. Gillis	Massachusetts.
Charles T. Gilden	Pennsylvania.
Wesley Good	Missouri.
Sidney W. Gordon	Canada.
Leslie H. Grant	New Jersey.
F. H. Grensel, A.B.	Michigan.
John Grieder, Jr.	New Jersey.
Percy L. Haight	New York.
Herbert E. Hall	British Columbia.
Charles R. Hambly	Illinois.
R. S. Hanna	Canada.
Richard C. Hart	New York.
Harrie T. Harvey	Michigan.
W. G. Henry	Pennsylvania.
W. E. P. Hewitt	Canada.
F. B. Hewett	New York.
R. Russell Hogue	Georgia.
T. C. Hutchinson	Iowa.
John L. Jamieson	Ohio.
Bertha M. Jarrett	Pennsylvania.
William Jones	New York.
Elton E. Jordan	Maine.
Lewis H. Kalloch	Rhode Island.
H. P. Kenney	Canada.
C. J. Kennerdell	Pennsylvania.
Charles A. Kendall	Canada.
James A. Kent	Minnesota.
Frank W. Ketner	Pennsylvania.
Howard Kingsbury	Pennsylvania.
E. L. Lane	Oregon.
Edgar D. Larkin	Pennsylvania.
Albert W. Lavelli	Connecticut.
Arthur Lemieux	Canada.
T. Segall Levien	Russia.
Sam'l Loebenstein	Missouri.
Charles N. Lord	New York.
Frank R. Lord	New York.
F. M. Lynch	Washington.
James A. Lynch	Massachusetts.
Peter McGill, M.D.	New Jersey.
A. P. McInnis	Minnesota.
John J. McKinstry	Pennsylvania.
A. J. L. McKechnie	Canada.
James A. McLaren	Canada.
P. J. Macdonald	Massachusetts.
Hugh S. Mackay	Canada.
Carl C. Marggraff	Connecticut.

NAME.	STATE OR COUNTRY.	NAME.	STATE OR COUNTRY.
W. E. Marshall	Canada.	G. W. Schock, Jr	Pennsylvania.
Charles F. Meacham	Vermont.	Maurice P. Searle	Ohio.
L. D. Mitchell	Canada.	Frederick F. Seavers	Minnesota.
Harry C. Moore	Delaware.	W. B. Sherman	California.
E. H. Munger	Connecticut.	J. C. Shields, Jr	Oregon.
Walter B. Ousley	Iowa.	Ella R. Shinn	New Jersey.
E C. Palmer	Nebraska.	Edward Shotthafer	New York.
W. T. Pearsoll	Pennsylvania.	E. R. Simmons	Germany.
Mme. M. Pedemonte	Austria.	John L. Spanogle	Pennsylvania.
Oliver K. Pellman	Pennsylvania.	J. Henry Stackhouse	Canada.
Edward J. Pierce	New York.	Milo H. Steele	Canada.
Glenn F. Pollard	New York.	Robert J. Stevens	Canada.
W. Henry Povall	New York.	Margaret E. Taylor	Pennsylvania.
J. B. Pressey	New Jersey.	Zane B. Taylor	Pennsylvania.
J. W. Purdy	Canada.	D. A. Telfer	Wisconsin.
R. L. Randall	New York.	A. Howard Thomas	Pennsylvania.
Adolph G. Reinhardt	Pennsylvania.	George K. Thomson	Canada.
C. H. Reynolds	Pennsylvania.	J. Melville Thompson	New York.
Henry W. Richards	Utah.	Frank L. Warren	New York.
Duncan P. Robertson	Canada.	Hugh A. Whytock	Utah.
Jonas S. Rosenthal	Pennsylvania.	L. N. Wiley	Connecticut.
Louis L. Ruppert	New Jersey.	Charles D. Winsor	Rhode Island.
David A. Scobie	New York.	Wallace Wood, Jr	Louisiana.

UNIVERSITY OF CALIFORNIA—COLLEGE OF DENTISTRY.

THE annual commencement exercises of the College of Dentistry of the University of California were held at Odd Fellows' Hall, San Francisco, Cal., on Wednesday evening, December 23, 1891.

An address was delivered on behalf of the faculty by Leander Van Orden, Jr., M.D.

The number of matriculates for the session was ninety-seven.

Certificates of graduation were granted to the following students by Professor Clark L. Goddard, A.M., D.D.S., chairman of the faculty; and at the regular meeting of the board of regents, on February 9, 1892, the degree of D.D.S. was conferred on them, in conformity with the recommendation to that effect:

NAME.	STATE.	NAME.	STATE.
Josephine W. Armstrong	California.	Charles A. Meek	California.
Charles F. Bauer	California.	Albert D. E. Miles	California.
Charles H. Bell	California.	Robert F. Millar	California.
John M. Blodgett	California.	Robert I. Moore	California.
Cecil Corwin	California.	Howard D. Noble	Iowa.
D. Carter Elliott	Michigan.	Forrest H. Orton	Minnesota.
Philip F. Frear	California.	Frank H. Phillips	California.
Charles L. Griswold	California.	Harry G. Richards	California.
Charles G. Hyde	California.	Harold L. Seager	Turkey.
Edwin C. Hyde	California.	Harry H. Shaw	California.
William Martin	California.	George N. Van Orden	California.
John P. McCarty	California	Gustavus A. Weyer	California.

PENNSYLVANIA COLLEGE OF DENTAL SURGERY.

THE thirty-sixth annual commencement exercises of the Pennsylvania College of Dental Surgery were held at the American Academy of Music, Philadelphia, Pa., on Wednesday evening, March 2, 1892, at 8 o'clock.

The annual address was delivered by Professor Albert P. Brubaker, M.D., D.D.S.

The number of matriculates for the session was two hundred and seven.

The degree of D.D.S. was conferred on the following graduates by I. Minis Hayes, M.D., president of the board of corporators :

NAME.	STATE OR COUNTRY.
C. E. Algeire	New York.
C. M. Ashton	Pennsylvania.
A. R. Atwood	New Jersey.
Edwin Banton	New York.
H. Baumgartner	Pennsylvania.
Caleb Bird	New York.
Edith L. Brown	Pennsylvania.
H. S. Brown	Pennsylvania.
Sylvester Byrne, Jr.	Pennsylvania.
Thos. H. Carr	New York.
D. H. Covert	Canada.
C. C. Corbiere	California.
C. J. Chambers	Pennsylvania.
S. S. Crow	Missouri.
John Davenport	Pennsylvania.
A. R. Day	New York.
W. H. Deal	New York.
George Doerbecker	Illinois.
George R. Drew	Massachusetts.
H. J. Fleming	Pennsylvania.
Henry Fischer	Germany.
L. H. Frantz	Pennsylvania.
C. E. Foster	New Hampshire.
Emilio Galvis	Colombia, S. A.
Wm. Glading	Pennsylvania.
W. B. Gearhart	Pennsylvania.
W. C. Griffith	Pennsylvania.
Geo. F. A. Graf	New York.
C. H. Green	Delaware.
Mayo A. Greenlaw	California.
W. C. Gutelius	Pennsylvania.
F. E. Gutelius	Pennsylvania.
A. J. Hamm	Massachusetts.
Josiah Hartzell	Ohio.
Mittie Tudor Haley	Virginia.
E. B. Heston	Pennsylvania.
Luther Hogarth	Canada.
Edwin Hollenback	Pennsylvania.
C. A. Hottenstein	Pennsylvania.
Alice Jarvis	Michigan.
Mary Jaffe	Russia.
Samuel Johnson	New Jersey.
M. W. Jennings	Pennsylvania.
A. H. Keats	Minnesota.
Mary E. Keyser	Pennsylvania.
George Kumpf	Canada.
H. H. Kuhn	Maryland.
W. H. Lancaster	Connecticut.
P. L. Longnecker	Pennsylvania.
M. W. Maratta	Pennsylvania.
O. J. Marcy	Pennsylvania.
Jeannie Maguin	Germany.
W. C. McCarthy	New York.
G. S. McDowell	Pennsylvania.
Joe E. Mitinger	Pennsylvania.
G. A. Miller	Pennsylvania.
E. L. Moore	Pennsylvania.
W. A. May	Canada.
D. H. Morgan	Ohio.
T. D. Morrison	Kentucky.
D. A. Myers	Pennsylvania.
Girardo Nuñez	Colombia, S. A.
J. C. Nolen	Pennsylvania.
C. L. Pearson	New York.
R. B. Pealer	Pennsylvania.
J. R. Powell	New York.
Pauline Prime	New York.
Raul Ramos	Cuba.
Samuel Rankin	Pennsylvania.
W. A. Robb	Pennsylvania.
Joaquin Restrepo	Colombia, S. A.
J. C. Reynolds	Pennsylvania.
E. C. Rice	Pennsylvania.
Oswaldo Ros	Cuba.
J. H. Ross	Missouri.
J. W. Ross	Pennsylvania.
W. J. Roe	Canada.
J. H. Russell	Pennsylvania.
W. A. Russell	Pennsylvania.
J. P. Sager	Pennsylvania.
Sophie T. Satinover	Roumania.
F. W. Shepherd	Wisconsin.
Ivar Siqveland	Minnesota.
E. M. Slonaker	Pennsylvania.
J. H. Slaughter	New Jersey.
M. W. Snow	Utah.
O. W. Snow	Utah.
Martha Sochatzey	Germany.
Thad. Stine	Pennsylvania.
M. A. Street	New Jersey.
C. S. Street	New Jersey.
E. A. Talmage	Pennsylvania.
F. W. Tate	New York.
L. G. Terry	New York.
John Toprahanian	Turkey.
J. W. Todd	Pennsylvania.
Archie V. Toy	Pennsylvania.
G. A. Vandersluis	Minnesota.
C. E. Wade	Pennsylvania.
E. F. Wayne	Pennsylvania.
J. H. Wardlaw	Canada.
G. M. Weirich	Pennsylvania.
E. C. Wiley	Pennsylvania.

VANDERBILT UNIVERSITY—DEPARTMENT OF DENTISTRY.

THE thirteenth annual commencement exercises of the Department of Dentistry of Vanderbilt University were held at the Vendome Theater, Nashville, Tenn., on Tuesday evening, March 8, 1892.

The class oration was delivered by C. J. Washington, D.D.S., and the faculty address by C. S. Stockton, D.D.S.

The number of matriculates for the session was one hundred and twenty-six.

The degree of D.D.S. was conferred on the following graduates by L. C. Garland, LL.D., chancellor of the university:

NAME.	STATE.
V. W. Alexander	New York.
C. R. Adams	Mississippi.
C. S. Allred	Alabama.
J. M. Ashburn	Tennessee.
G. M. Brown	Michigan.
L. Bland	Louisiana.
E. A. Brown	Texas.
F. Bartell	Illinois.
J. A. Beavers	Alabama.
J. R. Beach	Tennessee.
J. S. Brown	Mississippi.
T. K. Barefield	Mississippi.
J. P. Corley	Alabama.
R. H. Carratte	Iowa.
R. Z. Chapman	Alabama.
J. J. Cook	Michigan.
D. P. Cook	Kentucky.
S. C. Cawthon	Florida.
W. J. Dillard	Texas.
J. S. Dalton	Missouri.
S. K. Davidson	Kentucky.
E. H. Dennison	Connecticut.
C. C. Evans	Illinois.
C. Eshleman	Iowa.
T. A. Fayette	Alabama.
F. B. Gaither	North Carolina.
C. B. Graham	South Carolina.
W. I. Hale	Alabama.
W. L. Hansbro	Tennessee.
A. C. Jones	Tennessee.
R. A. Jones, Jr.	Alabama.
W. I. Johnson	Alabama.
E. L. Kendrick	Alabama.
B. E. Kidd	Alabama.
O. G. Mingledorff	South Carolina.
T. W. McKell	Mississippi.
M. B. McCrary	Tennessee.
J. M. Murphree	Alabama.
C. W. Mathison	Alabama.
J. M. Millen	Tennessee.
G. Minnick	Illinois.
A. I. Newcomer	Illinois.
J. B. Penny	Missouri.
J. H. Palm	Germany.
W. H. Powell	Louisiana.
A. L. Pedigo	Texas.
M. D. Steele	Louisiana.
C. A. Sevier	Tennessee.
R. Sanderson	Alabama.
F. W. Simons	Texas.
W. K. Slater	Tennessee.
C. C. Sims	Arkansas.
N. W. Sherman	Tennessee.
M. O. Saller	Kentucky.
H. E. Spencer	Mississippi.
W. S. Taylor	Kentucky.
R. E. Thornton	Georgia.
F. O. H. Thiele	Germany.
C. J. Washington	Tennessee.
V. B. Warrenfells	Virginia.
J. D. Wise	Alabama.
F. P. Ward	Alabama.
W. L. Weathersby	Mississippi.
N. F. Weatherby	Mississippi.
H. W. Walker	Georgia.
V. H. Ward	Mississippi.
V. A. Williams	California.
H. Wiggins	Texas.
A. Walker	Georgia.
C. M. Walton	Tennessee.

OHIO COLLEGE OF DENTAL SURGERY.

THE forty-sixth annual commencement of the Ohio College of Dental Surgery (Department of Dentistry of the University of Cincinnati) was held at the Odeon, Cincinnati, Ohio, on Wednesday evening, March 9, 1892.

An address was delivered by Dr. W. O. Thompson, president of Miami University, and the class oration was by Garrett A. Billow, D.D.S.

The number of matriculates for the session was one hundred and forty-three.

The degree of D.D.S. was conferred on the following graduates by James Leslie, D.D.S., of the board of trustees:

NAME.	STATE OR COUNTRY.
John Ray Adair	Kentucky.
Alexander Scott Ager	Ohio.
Anthony L. Amann	Ohio.
Charles D. Arthur	Pennsylvania.
Charles P. Balger.	Ohio.
Isaac Pettit Bell	Canada.
Porter A. Bereman	Ohio.
Charles Solomon Beyl	Ohio.
Garrett Allen Billow	Ohio.
Will Gavit Bradford	Ohio.
Louis Arnold Broring	Ohio.
Harry Lincoln Brown	Illinois.
Fred D. Burnham	Ohio.
Julian C. Cavagna	Ohio.
Henry M. Chaney	Ohio.
George A. Chapman	Washington.
Chas. C. Cherryholmes	Nebraska.
Joseph Boran Cochran	Kentucky.
Charlie Alvie Cole	Ohio.
John Lorenzo Conn	Kansas.
Neclessen S. Cox	Indiana.
Robert L. Criswell	West Virginia.
Harrison James Custer	Ohio.
Miss Hattie A. Dobell	Indiana.
Elvin Parker Eddy	Ohio.
William B. Fahnestock	Ohio.
Philip Robert Feigle	Kentucky.
Orlando Moses Flinn	Indiana.
Edward B. Greenlee	Ohio.
Alex. Hall	Canada.
Ernest Rush Hall	Ohio.
Frank P. Hamilton	Ohio.
Clement V. Hargitt	Ohio.
Herman Haupt	Germany.
Homer T. Hawkins	Ohio.
Lonzo Carl Hill	Ohio.
Horace Anson Holmes	Michigan.
Curtin Joseph Howe	Pennsylvania.
Harold Lorenz Jensen	Louisiana.
Archie Hubert Johnson	Missouri.
David Saylor Johnson	Pennsylvania.
Allen John Kimm	Indiana.
Augustus F. Knapp	New York.
Henry Charles LeBeau	Ohio.
Robbins Foster Lilly	Ohio
George Love	Ohio.
Will Marquart	Ohio.
William H. McAdow	Ohio.
Samuel H. McCleery	Pennsylvania.
Louis Eugene Menuez	Ohio.
Charles Willett Mills	Ohio.
George C. Minturn	Ohio.
Leon David Monks	Pennsylvania.
George Edward Moore	Canada.
H. Sterling Moore	Ohio.
Montie A. Morey	Michigan.
Edward P. Nugent	Kansas.
David C. Patterson	Kentucky.
Edwin Auber Peebles	Ohio.
King Sansom Perry	Pennsylvania.
Robert Gale Pinney	Missouri.
Wilber Nathan Priddy	Kansas.
William Alonzo Pride	Ohio.
Henry W. Radcliff	Wisconsin.
Frank Benjamin Rees	Ohio.
Oliver T. Robertson	Ohio.
James H. Robinson	Canada.
Edwin Launder Ross	Ohio.
Daniel U. Ruegsegger	Ohio.
Rudolph Schmid	Switzerland.
Albert Edward Sexton	Indiana.
Charles W. Sodders	Ohio.
Talmon H. Speece	Ohio.
Henry Marion Smith	Minnesota.
Charles W. St. Clair	Ohio.
James Berry Stewart	Ohio.
William H. Tenney	Ohio.
Clyde E. Townley	Pennsylvania.
Joseph A. Turner	Ohio.
Rees L. H. Turner	Missouri.
Francis M. Van Buskirk	Ohio.
Horatio F. Vandervort	Ohio.
Thomas Corwin White	Ohio.
John C. Wilde, Jr	Michigan.
William E. Wilkinson	Ohio.
Ellsworth Williams	Indiana.
Franz Ellias Willison	Michigan.
Mrs. Mellie C. Winslow	Indiana.
Sherman T. Yaple	Ohio.

SOUTHERN MEDICAL COLLEGE—DENTAL DEPARTMENT.

THE fifth annual commencement exercises of the Dental Department of the Southern Medical College were held at De Give's Opera House, Atlanta, Ga., on February 29, 1892.

The valedictory address was delivered by W. S. Trent, D.D.S.

The number of matriculates for the session was ninety-eight.

The degree of D.D.S. was conferred on the following graduates by T. S. Powell, M.D., president of the board of trustees:

NAME.	STATE.
C. M. Bess	North Carolina.
W. E. Bugg	Georgia.
W. L. Bethea	Georgia.
W. A. Blasingame	Georgia.
C. C. Burbank	Texas.
H. W. Carpenter	Georgia.
W. L. Cason	Georgia.
T. D. Coty	Louisiana.
W. B. Cone	Florida.
J. E. Cramer	Georgia.
J. H. Cates	Georgia.
J. L. Dean	South Carolina.
G. W. Davis	Georgia.
W. A. Ellis	North Carolina.
Z. Greene	Alabama.
O. E. Griffin	Georgia.
G. K. Hawley	Connecticut.
J. G. Heard	Alabama.
W. L. Hightower	Alabama.
J. J. Hendley	Georgia.
T. W. Henderson	Georgia.
F. A. Henley	North Carolina.
H. R. Jewett	Georgia.
A. M. Jackson	Georgia.
R. P. Jackson	Georgia.
A. M. Jamesson	Georgia.

NAME.	STATE.
T. R. Jones	Georgia.
E. N. Kibler	South Carolina.
T. D. Leonard	Georgia.
G. R. Lovelace	Georgia.
W. C. Morgan	Florida.
W. G. Mason	Georgia.
W. F. Moore	Texas.
C. Mermilloid	Louisiana.
J. C. Powell	Georgia.
S. O. Poore	Georgia.
C. C. Parish	Georgia.
A. C. Parry	Georgia.
A. A. Patterson	South Carolina.
R. A. Patterson	Georgia.
J. R. Rountree	Georgia.
T. B. Robbins	Alabama.
G. D. Stovall	Alabama.
J. C. Smith	Georgia.
F. H. Smith	Mississippi.
D. M. Snelson	Georgia.
W. H. Spinks	Texas.
W. A. Summerlin	Georgia.
W. S. Trent	Alabama.
W. E. Wheeler	Tennessee.
J. R. Warren	———

MISSOURI DENTAL COLLEGE.

THE twenty-sixth annual commencement of the Missouri Dental College (Dental Department of Washington University) was held in Memorial Hall, St. Louis, Mo., on Thursday evening, March 10, 1892.

The address to the class was delivered by Professor William T. Porter.

The number of matriculates for the session was seventy-seven.

The degree of D.D.S. was conferred on the following graduates by Chancellor Chaplin, of the university:

NAME.	STATE.
Fred. H. Achelpohl	Missouri.
George W. Applegate	Missouri.
Orion W. Bedell	Ohio.
Joseph L. Bridgford	Missouri.
Otis F. Burton	Missouri.
Herman F. Cassell	Missouri.
Isaac B. Coil	Texas.
Clarence C. Cowdery	Ohio.
William G. Cox	Missouri.
William G. Goodrich	Missouri.
Lawrence E. Gordon	Illinois.
Christy G. Hampton	Missouri.
Richard J. Hart	Wisconsin.
Thomas D. Head	Missouri.
Everett M. Hurd	Nebraska.
Willard P. Inglish	Missouri.
Sigmund Jacoby	Missouri.

NAME.	STATE.
William Kalbfleisch	Illinois.
Alfred Lambert	Illinois.
Arthur N. Milster	Missouri.
Otto Mallinckrodt	Missouri.
Arthur T. Moser	Missouri.
Christian Muetze	Missouri.
Ormund H. Manhard	Missouri.
Henry F. Naumann	Missouri.
John L. Perry	Illinois.
Walter L. Pruett	Missouri.
William F. Schwaner	Iowa.
Emil Schaer	Switzerland.
Otis Trotter	Missouri.
William G. Teel	Virginia.
Harry G. C. Van Aller	Germany.
Frank F. Worthen	Illinois.

UNIVERSITY OF IOWA—DENTAL DEPARTMENT.

THE tenth annual commencement exercises of the Dental Department of the State University of Iowa were held at the Armory, Iowa City, Iowa, on Thursday evening, March 10, 1892.

The annual address was delivered by John J. R. Patrick, M.D., D.D.S.

The number of matriculates for the session was one hundred and thirty-four.

The degree of D.D.S. was conferred on the following graduates by Charles A. Schaeffer, Ph.D., president of the university:

NAME.	STATE.
Mannie F. Anderson	Iowa.
Daniel B. F. Anderegg	Minnesota.
Hiram W. Anger	Iowa.
Ray N. Baker	Iowa.
James William Ball	Iowa.
Frank Alfred Boysen	Iowa.
Hugo Arthur Braun	Iowa.
Hiram Walter Baldwin	Wisconsin.
Michael Brennan	Wisconsin.
John Clifton Braley	Illinois.
Charles Preston Burt	Illinois.
Michael Henry Breen	Iowa.
Elmer H. Ball	Nebraska.
John Frank Curry	New York.
Frank P. Chapman	Iowa.
William A. Dredge	Minnesota.
Charles Frank Dwight	Iowa.
Edward S. Denbo	Indiana.
Louis A. Grigsby	Illinois.
John Clavele Holson	Iowa.
James C. Hullinger	Iowa.
William S. Hosford, A.B.	Iowa.
Michael A. Humphrey	Iowa.
Thomas Bayard Heckert	Iowa.
Desway A. Haines	Iowa.
Loxley George Holmes	Iowa.
Howard M. Harlan	Iowa.
M. Addison H. Jones	Iowa.
Charley Harry Jacobs	Iowa.
Harry Kelso	Iowa.
Edward W. Kerr	Iowa.
Carl Baker Miller	Iowa.
John Grant McCartney	S. Dakota.
Harry C. McCrea	Iowa.
Edward S. McWhorter	Colorado.
Olinda Augusta Otte	Kansas.
Julia Amanda Otte	Kansas.
Ann Elizabeth Owens	Iowa.
William Henry Pallett	Nebraska.
William Warner Perry	Illinois.
Benjamin A. Price	Iowa.
Herman R. Pasedach	Iowa.
George F. Pratt	Iowa.
Earnest Albert Rogers	Iowa.
Hiram F. Randolph	Iowa.
Guy Hilton Reynolds	New York.
Horace C. Shoemaker	Iowa.
William M. Schlawig	Iowa.
Wallace G. Skidmore	Illinois.
James E. Stinehart	Iowa.
Timothy S. Stanford	Pennsylvania.
Stephen Ralph Swain	Iowa.
Oliver Henry Sassoman	Iowa.
Frederick A. Strayer	Iowa.
Mahlon W. Warner	Iowa.
Robert Jessup Wilson	Iowa.
Frank Raymond Wright	Iowa.

MEHARRY MEDICAL COLLEGE—DENTAL DEPARTMENT.

THE sixth annual commencement of the Dental Department of Meharry Medical College was held, in connection with that of the medical and pharmaceutical, at Nashville, Tenn., February 18, 1892.

George W. Miller, of the medical class, gave the address of welcome, and J. W. Holmes delivered the valedictory. Robert Tyler, of Alabama, represented the pharmaceutical class.

The charge to the graduates was given by R. F. Boyd, M.D., D.D.S., Professor of Physiology, Hygiene, and Clinical Medicine. Rev. John Pierson, D.D., of Cincinnati, was present and gave an earnest and appropriate address to the graduating classes.

During the past session seven students have been enrolled in the dental department.

President J. Braden conferred the degree of Doctor of Dental Surgery on J. B. Singleton, of South Carolina.

WESTERN DENTAL COLLEGE.

THE second annual commencement exercises of the Western Dental College were held in Music Hall, Kansas City, Mo., on Thursday evening, March 10, 1892.

The faculty address was delivered by Professor H. O. Hanawalt.

The number of matriculates for the session was seventy-nine.

The degree of D.D.S. was conferred on the following graduates by the president of the college:

NAME.	STATE.	NAME.	STATE.
L. P. Austin	New York.	Otto Jacobs	Missouri.
K. P. Ashley	Kansas.	O. J. Kemper	Missouri.
W. C. Allen	Missouri.	C. B. Leaver	Missouri.
E. C. Brownlee	Missouri.	I. B. Nordyke	Missouri.
A. C. Barr	Illinois.	P. J. Oriley	Missouri.
W. H. Condit	Kansas.	S. T. Peter	Nebraska.
T. H. Cunningham	Missouri.	C. Robertson, Jr	Kansas.
F. W. Drom	Nebraska.	H. H. Sullivan	Missouri.
R. E. Darby	Missouri.	W. W. Simpson	Kansas.
Fred. M. Franklin	Missouri.	A. L. Smith	Missouri.
F. E. Gaines	Missouri.	J. F. Spence	Missouri.
T. J. Henkens	Kansas.	J. H. Swan	Missouri.
T. I. Hatfield	Kansas.	E. C. Taylor	Missouri.
D. J. Hayden	Kansas.	M. D. Vanhorn	Illinois.
William Harrison	Missouri.	O. C. West	Missouri.
C. C. Jones	Kansas.	Frank S. Webster	Kansas.
L. G. Jones	Kansas.	A. S. Wright	Missouri.
S. E. Johnson	Kansas.	H. Yant	Kansas.
F. W. Johnson	Missouri.	Mrs. Alice Yant	Kansas.

KANSAS CITY DENTAL COLLEGE.

THE tenth annual commencement exercises of the Kansas City Dental College were held in the Grand Avenue M. E. Church, Kansas City, Mo., on Friday evening, March 4, 1892.

The faculty address was delivered by Professor Theodore Stanley, and one was also made by Rev. J. E. Roberts.

The number of matriculates for the session was eighty-seven.

The degree of D.D.S. was conferred on the following graduates by Dr. L. C. Wasson, president of the college association:

George W. Amerman.
David K. Bryson.
Frank M. Blake.
Johann C. Buttner.
Jefferson D. Barton.
Robert E. Barton.
Arthur H. Bagby.
James W. Butt.
Ludwig H. Bredouw.
John M. Campbell.
Fred. Lewis Cobb.
Frank L. Carter.
Gustavus M. Cross.
Fred. P. Cronkite.
Eugene A. Chase.
Charles Wm. Day.
Harry M. Doyle.
Irwin W. Dills.
Harry B. Engel.
Amasa M. Farnham.
Oliver T. Griner.
James H. Goodwin.
Schuyler C. Grant.
Alanson T. Havely.
Martin H. Hopfer.
Walter E. Highnote.
John H. Jenkins.
Henry W. Kelly.
John G. A. Kydd.
Mark C. Lovell.
Henry E. Lindas.
Arthur L. Lindsey.
William A. McKee.
George D. Mitchell.
Ernest P. Noble.
James D. Neff.
Clifford H. Nelson.
James W. O'Bryon.
Daniel F. Pendleton.
Samuel J. Renz.
Woodson T. Smith.
Ole A. Smith.
Charles W. Thompson.
Harry H. Turner.
Arthur M. Tutt.
George L. Tetrick.
Frank L. Williams.
Ned E. White.
John B. Woodside.
Pitts E. Wilhite.

AMERICAN COLLEGE OF DENTAL SURGERY.

THE sixth annual commencement exercises of the American College of Dental Surgery were held at Hooley's Theater, Chicago, Ill., on Wednesday, March 9, 1892, at 2 P.M.

The valedictory address was delivered by H. E. Myers, D.D.S.

The degree of D.D.S. was conferred on the following members of the graduating class:

W. C. Brown.
F. F. Brown.
A. J. Bacon.
W. T. Corwith.
C. M. Cody.
C. I. Chase.
George Collins.
C. L. Crossman.
A. E. Crum.
I. B. Carolus.
L. M. Darling.
P. E. Douglass.
C. L. Davis.
H. W. Davenport.
E. A. Friis.
R. M. Grimes.
A. L. Gilmer.
V. C. Garratt.
W. S. Graves.
W. S. Harter.
R. V. Hurdle.
E. C. Hoffman.
O. C. Hall.
Caroline L. Hartt.
J. Hetu.
C. S. Irwin.
Jennie Loretto Kelly.
H. P. Loomis.
C. L. H. Lennmalm.
W. H. Lillibridge.
J. A. Messenger.
H. E. Myers.
Geo. W. Mills.
W. N. McKay.
M. G. E. Marshall.
C. S. Marshall.
W. T. Morris.
A. S. Marshall.
W. A. Nelson.
J. M. Oaks.
I. J. Pierce.
Edgar Palmer.
Josephine D. Pfeifer.
W. E. Pilcher.
S. T. Rice.
Fanny M. Rowley.
F. C. Ross.
Adelaide F. Rix.
W. T. Rogers.
W. E. Sturmberg.
B. R. Simons.
A. E. St. John.
W. R. Smith.
A. O. Stutenroth.
H. F. Stempel.
C. F. Smith.
Lucy M. Scott.
George Steele.
Florence E. Thompson.
C. C. Trowbridge.
L. A. Tidball.
H. H. Von Lackum.
S. A. Wilson.
I. C. Ward.
H. J. Wallin.
V. S. Wisner.

INDIANA DENTAL COLLEGE.

THE thirteenth annual commencement exercises of the Indiana Dental College were held at English's Opera House, Indianapolis, Ind., on Tuesday evening, March 1, 1892.

An address was delivered by Dr. John D. P. John, president of De Pauw University.

The number of matriculates for the session was eighty-eight.

The degree of D.D.S. was conferred on the following graduates by Dr. Seneca B. Brown, president of the college:

NAME.	STATE.
W. Anderson	Minnesota.
W. G. Burket	Indiana.
B. F. Batson	Illinois.
G. W. Burch	Nebraska.
C. E. Burket	Indiana.
Orlando Burns	Indiana.
J. H. Bloor	Ohio.
W. J. Bradbury	Wisconsin.
G. G. Bilman	Indiana.
H. M. Brown	Illinois.
W. T. Clarke	Texas.
Harry Corken	Ohio.
W. E. Diley	Indiana.
H. E. Dewar	Michigan.
D. A. Elwell	Ohio.
G. C. Fleischman	Wisconsin.
Charles B. Fletcher	Indiana.
W. A. Gant	Indiana.
E. H. Gage	Indiana.
J. H. George	Indiana.
H. C. Goodrich	Indiana.
C. F. Gray	Indiana.
B. F. Gray	Indiana.
D. W. Gray	Indiana.
W. M. Hall	Indiana.
J. E. Henderson	Indiana.
W. H. Harp	Illinois.
D. S. Hontz	Indiana.
W. Z. King	Indiana.
C. C. Lester	Indiana.

NAME.	STATE.
D. L. Lucas	California.
B. B. Lockhart	Indiana.
J. O. Miessen	Indiana.
P. N. Maln	Minnesota.
W. J. Morris	Indiana.
W. L. McNamara	Ohio.
A. A. Powell	Indiana.
E. E. Pierce	Indiana.
D. L. Prall	Indiana.
P. A. Rood	Indiana.
Claude V. Runyan	Indiana.
M. A. Root	Michigan.
W. B. Ridgeway	Indiana.
Elmer A. Smythe	Indiana
R. W. Sessions	Indiana.
Blaine Sellers	Indiana.
J. G. Schneider	Wisconsin.
T. W. Scott	Ohio.
E. B. Tyler	Indiana.
C. W. Throop	Michigan.
F. E. Woods	Indiana.
Q. H. Woodruff	Indiana.
M. L. White	Indiana.
F. Wright	Minnesota.
A. T. White	Indiana.
F. Winchester	Michigan.

DENTAL SOCIETY ANNOUNCEMENTS.

Dental Society of the State of New York.

The Dental Society of the State of New York will hold its twenty-fourth annual meeting at Albany, Wednesday and Thursday, May 11 and 12, 1892.

Papers will be read by the following distinguished members of our profession: Edwin T. Darby, D.D.S., Philadelphia, Pa.; Eugene S. Talbot, D.D.S., Chicago, Ill.; C. F. W. Bödecker, D.D.S., New York city; Albert Carter Westlake, D.D.S., Elizabeth, N. J., and discussed by prominent dentists from all parts of the United States. In order that the discussions may be interesting, all those who have been invited to open discussions will be allowed fifteen minutes, others ten.

Nothing will be left undone to promote the interests of practical and scientific dentistry.

No clinics. No exhibits.

Please set aside the above time, and do your share to advance the status of dentistry in the Empire State.

Yours faithfully,

W. W. Walker, *President*,
67 West Ninth street, New York.
C. S. Butler, *Secretary*,
680 Main street, Buffalo, N. Y.

Joint Union Meeting of the New Jersey and Pennsylvania State Dental Societies.

There will be a joint union meeting of the New Jersey and Pennsylvania State Dental Societies held at Cresson Springs, Pa., on July 20, 21, and 22, 1892. We expect this to be one of the largest dental meetings ever held in this section of the country.

All who wish to give clinics can communicate during April and May with

Dr. P. K. Filbert, of Pottsville, Pa., *Chairman of Clinic Committee for Pa. Society;*

Dr. S. C. G. Watkins, of Montclair, N. J., *Chairman of Clinic Committee for N. J. Society.*

IOWA DENTAL SOCIETY.

THE thirtieth annual meeting of the Iowa Dental Society will be held at Ottumwa, Iowa, May 3, 4, 5, and 6, 1892. All are cordially invited to attend.

G. W. MILLER, *Secretary*,
Des Moines, Ia.

NORTH CAROLINA STATE DENTAL SOCIETY.

THE North Carolina State Dental Society will hold its eighteenth annual meeting at Winston, N. C., on May 24, 25, and 26, 1892. Members of the profession are cordially invited to attend.

The State Board of Dental Examiners will also meet at the same time and place. J. E. WYCHE, *Secretary*, Oxford, N. C.

NORTHERN OHIO DENTAL ASSOCIATION.

THE thirty-third annual meeting of the Northern Ohio Dental Association will be held at the Hollenden, Cleveland, Ohio, May 10, 11, and 12, 1892.

Members of the profession are cordially invited to attend.

HENRY BARNES, *Cor. Secretary*,
106 Euclid ave., Cleveland, O.

SOCIETY OF THE ALUMNI, UNIVERSITY OF PENNSYLVANIA.

THE annual reunion of the Society of the Alumni, Department of Dentistry, University of Pennsylvania, will occur on the afternoon and evening of May 5, 1892, at the Stratford, Broad and Walnut streets, Philadelphia.

The program will consist of papers and discussions in addition to the regular society business, followed by a supper.

W. L. WINNER, *Secretary*,
309 N. Sixth street, Philadelphia.

WORLD'S COLUMBIAN DENTAL CONGRESS.

EXECUTIVE COMMITTEE.

Chairman, Dr. W. W. Walker, 67 West Ninth street, New York city; Secretary, Dr. A. O. Hunt, Iowa City, Iowa; Treasurer, Dr. J. S. Marshall, Argyle Building, Chicago, Ill.; Dr. W. J. Barton, Paris, Texas; Dr. L. D. Carpenter, Atlanta, Ga.; Dr. J. Y. Crawford, Nashville, Tenn.; Dr. M. W. Foster, Baltimore, Md.; Dr. A. W. Harlan, Chicago, Ill.; Dr. H. J. McKellops, St. Louis, Mo.; Dr. Geo. W. McElhaney, Columbus, Ga.; Dr. H. B. Noble, Washington, D. C.; Dr. J. C. Storey, Dallas, Texas; Dr. L. D. Shepard, Boston, Mass.; Dr. C. S. Stockton, Newark, N. J.; Dr. J. Taft, Cincinnati, Ohio.

COMMITTEE OF CONFERENCE FOR WORLD'S CONGRESS AUXILIARY.

W. D. Miller, Berlin, Germany; F. Busch, Berlin, Germany; Thos. W. Evans, Paris, France; E. Magitot, Paris, France; G. W. Sparrock, Lima, Peru; W. B. Macleod, Edinburgh; A. W. W. Baker, Dublin; Earnst Sjoberg, Stockholm, Sweden; Charles S. Tomes, London, England; W. H. Coffin, London, England; W. Geo. Beers, Montreal, Canada; H. C. Edwards, Madrid, Spain; E. Lecaudy, Paris, France; J. G. Van Marter, Rome, Italy; Plattschick, Pavia, Italy; Joseph Arkövy, Buda Pesth, Hungary; C. Redard, Geneva, Switzerland; W. H. Morgan, Nashville, Tenn.; W. H. Dwinelle, New York city; R. B. Winder, Baltimore, Md.; Elisha G. Tucker, Boston, Mass.; W. W. H. Thackston, Farmville, Va.; J. B. Rich, Washington, D. C.; J. D. White, Philadelphia, Pa.; W. H. Eames, St. Louis, Mo.; J. B. Patrick, Charleston, S. C.; C. C. Knowles, San Francisco, Cal.; F. J. S. Gorgas, Baltimore, Md.; G. V. Black, Jacksonville, Ill.; J. E. Garretson, Philadelphia, Pa.; R. Finley Hunt, Washington, D. C.; E. Bacon, Portland, Me.; Benjamin Lord, New York city; A. L. Northrop, New York city; W. W. Allport, Chicago, Ill.; W. W. Walker, New York city; L. D. Carpenter, Atlanta, Ga.; J. Y. Crawford, Nashville, Tenn.; W. J. Barton, Paris, Texas; J. Taft, Cincinnati, Ohio; C. S. Stockton, Newark, N. J.; L. D. Shepard, Boston, Mass.; H. J. McKellops, St. Louis, Mo.; A. O. Hunt, Iowa City, Iowa; H. B. Noble, Washington, D. C.; Geo. W. McElhaney, Columbus, Ga.; J. C. Storey, Dallas, Texas; M. W. Foster, Baltimore, Md.; A. W. Harlan, Chicago, Ill.; J. S. Marshall, Chicago, Ill.

SPECIAL COMMITTEES.

* Declined.

No. 1. General Finance Committee.

Chairman, L. D. Shepard, 330 Dartmouth street, Boston, Mass.; T. W. Brophy, 96 State street, Chicago, Ill.; A. L. Northrop, New York city.

No. 2. Program Committee—Not appointed.

No. 3. Committee on Exhibits.

Chairman, Chas. Pruyn, 70 Dearborn street, Chicago, Ill.; Arthur E. Matteson, 3700 Cottage Grove avenue, Chicago, Ill.; E. M. S. Fernandez, 103 State street, Chicago, Ill.

No. 4. Committee on Transportation.

Chairman, F. H. Gardiner, 126 State street, Chicago; V. H. Jackson, 340 Lenox avenue, New York city; George Eubank, Birmingham, Ala.

No. 5. Committee on Reception.

Chairman, W. W. Allport, 9 Jackson street, Chicago; W. W. H. Thackston, Farmville, Va.; * G. H. Bentley, 70 Dearborn street, Chicago; E. M. S. Fernandez, 103 State street, Chicago; George A. Christmann, Staats Zeitung Building, Chicago; James McManus, 32 Pratt street, Hartford, Conn.; Elisha G. Tucker, Boston, Mass.; John D. Thomas, 912 Walnut street, Philadelphia, Pa.; H. J. McKellops, 2630 Washington avenue, St. Louis; L. L. Dunbar, 560 Sutter street, San Francisco, Cal.; V. E. Turner, Raleigh, N. C.; Joseph Bauer, 130 Esplanade street, New Orleans, La.; J. F. P. Hodson, 19 West 39th street, New York city; W. P. Dickinson, 608½ Nicollett avenue, Minneapolis, Minn.; C. F. W. Holbrook, 34 Park street, Newark, N. J.; W. J. Foster, 9 West Franklin street, Baltimore, Md.; R. M. Sanger, East Orange, N. J.

No. 6. Committee on Registration.

Chairman, Fred A. Levy, 343 Main street, Orange, N. J.; E. L. Clifford, 401 West Monroe street, Chicago, Ill.; George N. West, 34 Monroe street, Chicago, Ill.; J. Y. Crawford, Nashville, Tenn.; C. V. Rosser, Atlanta, Ga.; T. L. James, Fairfield, Iowa; W. H. Fundenburg, 323 Pennsylvania avenue, Pittsburgh, Pa.

No. 7. Committee on Transactions—Not appointed.

No. 8. Committee on Conference with State and Local Societies.

Chairman, J. Taft, Cincinnati, Ohio.

List of State Committees.

Alabama—Chairman, E. S. Chisholm, Tuscaloosa; A. Eubank, Birmingham; Chas. P. Robinson, Mobile; G. M. Rousseau, Montgomery.

Alaska—No reply to letters.

Arizona—Chairman, L. N. Goodrich, Phœnix; D. Pentland, Prescott; J. Hardy, Phœnix; W. Warnekross, Tombstone.

Arkansas—Chairman, M. C. Marshall, Little Rock; W. B. Pollard, Hot Springs; L. K. Land, Pine Bluff; R. D. Seals, Fort Smith; A. E. Kimmons, Fort Smith.

California—Chairman, C. L. Goddard, San Francisco; W. J. Younger, San Francisco; E. L. Townsend, Los Angeles.

Colorado—Chairman, P. T. Smith, Denver; W. E. Griswold, Denver; H. P. Kelly, Denver; R. B. Weiser, Georgetown.

Connecticut—Chairman, E. S. Gaylord, New Haven; Jas. McManus, Hartford; R. W. Browne, New London.

Delaware—Chairman, C. H. Gilpin, Middleton; C. R. Jefferis, Wilmington.

District of Columbia—Chairman, Henry C. Thompson, Washington; R. B. Donaldson, J. Hall Lewis, L. C. F. Hugo, H. M. Schooley.

Florida—Chairman, J. N. Jones, Jacksonville; James Chace, Ocala; Duff Post, Tampa; I. J. Welch, Pensacola.

Georgia—Chairman, S. B. Barfield, Macon; John H. Coyle, Thomasville; H. H. Johnson, Macon; W. C. Wardlaw, Augusta.

Idaho—Chairman, E. L. P. Ector, Moscow; John H. McCallie, Moscow; A. Boston, Lewiston.

Illinois—Chairman, W. H. Taggart, Freeport; C. N. Johnson, Chicago; J. J. Jennelle, Cairo.

Indiana—Chairman, J. B. Morrison, Indianapolis; P. G. C. Hunt, Indianapolis; S. B. Browne, Fort Wayne.

Indian Territory—Letter returned unclaimed.

Iowa—Chairman, C. J. Peterson, Dubuque; S. C. Hatch, Sioux City; L. K. Fullerton, Waterloo.

Kansas—Chairman, L. C. Wasson, Topeka; C. E. Esterley, Lawrence; Wm. H. Shulze, Atchison.

Kentucky—Chairman, C. G. Edwards, Louisville; Chas. E. Dunn, Louisville; F. Peabody, Louisville.

Louisiana—Chairman, C. E. Kells, Jr., New Orleans; Joseph Bauer, New Orleans; Andrew G. Friedrichs, New Orleans.

Maine—Chairman, D. W. Fellows, Portland; Edmund C. Bryant, Pittsfield; Henry A. Kelly, Portland.

Maryland—Chairman, E. P. Keech, Baltimore; A. J. Volck, Baltimore; Edward Nelson, Frederick.

Massachusetts—Chairman, D. M. Clapp, Boston; Secretary, W. H. Potter, Boston; Eugene H. Smith, Boston; S. G. Stevens, Boston; D. B. Ingalls, Clinton; R. R. Andrews, Cambridge.

Michigan—Chairman, C. S. Case, Jackson; Geo. L. Field, Detroit; F. L. Owen, Grand Rapids.

Minnesota—Chairman, T. E. Weeks, Minneapolis; M. G. Jenison, Minneapolis; C. H. Robinson, Wabasha.

Mississippi—Chairman, Morgan Adams, Sardis; R. K. Luckie, Holly Springs; J. D. Miles, Vicksburg; G. B. Clements, Macon.

Missouri—Chairman, C. L. Hungerford, Kansas City; A. H. Fuller, St. Louis; J. D. Patterson, Kansas City.

Montana—C. S. Whitney, Miles City.

Nebraska—Chairman, H. T. King, Fremont; A. W. Nason, Omaha; H. C. Miller, Grand Island; H. J. Cole, Norfolk; I. W. Funck, Beatrice.

Nevada—Chairman, A. Chapman, Virginia City; M. A. Greenlaw, Reno; S. S. Southworth, Carson City.

New Hampshire—Chairman, C. W. Clements, Manchester; G. A. Young, Concord; Wm. Jarvis, Claremont; W. R. Blackstone, Manchester; C. H. Hayward, Peterborough; B. C. Russell, Keene.

New Jersey—Chairman, S. C. G. Watkins, Mont Clair; B. F. Luckey, Paterson; R. M. Sanger, E. Orange; C. A. Meeker, Newark.

New Mexico—Letter returned unclaimed.

New York—Chairman, John I. Hart, New York city; K. C. Gibson, New York; W. Carr, New York; M. L. Chaim, New York; Chas. S. Butler, Buffalo; F. A. Remington, New York.

North Carolina—Chairman, V. E. Turner, Raleigh; J. H. Durham, Wilmington; J. F. Griffith, Salisbury.

North Dakota—Chairman, S. J. Hill, Fargo; S. P. Johnson, Grand Forks; W. O. De Puy, Bismarck; H. S. Sowles, Wahpeton; E. M. Pierce, Hillsboro.

Ohio—Chairman, D. R. Jennings, Cleveland; H. F. Harvey, Cleveland; M. H. Fletcher, Cincinnati; L. E. Custer, Dayton; A. F. Emminger, Columbus.

Oklahoma Territory—Chairman, D. A. Peoples, Guthrie; G. F. Dean, Oklahoma City; J. S. Nicholson, El Reno.

Oregon—Chairman, S. J. Barber, Portland; E. G. Clark, Portland.

Pennsylvania—Chairman, L. A. Faught, Philadelphia; C. S. Beck, Wilkes-Barre; J. A. Libbey, Pittsburgh.

Rhode Island—No reply to letters.

South Carolina—Chairman, Thos. T. Moore, Columbia; W. S. Brown, Charleston; A. P. Johnstone, Anderson; B. H. Teague, Aiken.

South Dakota—Chairman, O. M. Huestis, Aberdeen; C. W. Stutenroth, Watertown; F. W. Blomiley, Sioux Falls.

Tennessee—Chairman, H. W. Morgan, Nashville; B. S. Byrnes, Memphis; W. H. Richards, Knoxville; H. E. Beach, Clarksville.

Texas—Chairman, W. R. Clifton, Waco; G. M. Patten, Galveston; Tom Robinson, Houston; Geo. S. Staples, Sherman; T. L. Westerfield, Dallas; H. J. McBride, Tyler.

Utah—Chairman, A. S. Chapman, Salt Lake City; A. B. Dunford, Salt Lake; F. W. Baker, Ogden.

Vermont—Chairman, G. F. Cheney, St. Johnsbury; Thomas Mound, Rutland; R. M. Chase, Bethel.

Virginia—Chairman, J. Hall Moore, Richmond; W. W. H. Thackston, Farmville; Jos. R. Woodley, Norfolk; E. P. Beadles, Danville; T. H. Parramore, Hampton; D. W. Rust, Alexander.

Washington—Chairman, W. E. Burkhardt, Tacoma; F. L. Hicks, Tacoma; J. C. Grasse, Seattle.

West Virginia—Chairman, H. H. Harrison, Wheeling; Jno. H. McClure, Wheeling; H. K. Jones, Parkersburg; George I. Keener, Grafton; J. N. Mahan, Charleston.

Wisconsin—Chairman, B. G. Marcklein, Milwaukee; C. C. Chittenden, Madison; George H. McCausey, Janesville.

Wyoming—Waiting for nominations.

No. 9. Committee on the History of Dental Legislation in this and other Countries.

Chairman, William Carr, New York city; Paul Dubois, 2 Rue d'Amsterdam, Paris, France; F. Busch, Berlin, Germany; J. H. Mummery, London, England; M. Etcheparaborda, Buenos Ayres, S. A.

No. 10. Auditing Committee.

Chairman, L. D. Shepard, Boston, Mass.; R. R. Andrews, Cambridge, Mass.; Chas. A. Meeker, Newark, N. J.

No. 11. Committee on Invitation.

Chairman, W. C. Barrett, 208 Franklin street, Buffalo, N. Y.; E. T. Darby, 1513 Walnut street, Philadelphia, Pa.; S. G. Perry, 46 West 37th street, New York city; W. C. Wardlaw, Augusta, Ga.; S. W. Dennis, 81 Flood Building, San Francisco, Cal.; *Thos. H. Chandler, 161 Newbery street, Boston, Mass.; J. D. Patterson, Kansas City, Mo.

No. 12. Committee on Membership.

Chairman, Edmund Noyes, 65 Randolph street, Chicago, Ill.; B. F. Luckey, Paterson, N. J.; E. S. Chisholm, Tuscaloosa, Ala.; C. M. Bailey, 28 Syndicate Block, Minneapolis, Minn.; Dan'l N. McQuillen, 1628 Chestnut street, Philadelphia, Pa.

No. 13. Committee on Education and Literary Exhibits.

Chairman, J. J. R. Patrick, Bellville, Ill.; J. Y. Crawford, Nashville, Tenn.; A. H. Fuller, 2602 Locust street, St. Louis, Mo.; C. A. Brackett, 102 Truro street, Newport, R. I.; B. H. Catching, Atlanta, Ga.

No. 14. Committee on Clinics in Operative Dentistry and Oral Surgery.

Chairman, C. F. W. Bödecker, 60 East 58th street, New York city; *J. E. Garretson, Philadelphia, Pa.; John S. Marshall, Chicago, Ill.; Arthur B. Freeman, Chicago, Ill.; H. H. Schumann, Chicago, Ill.; Henry W. Morgan, Nashville, Tenn.; William Crenshaw, Atlanta, Ga.

No. 15. Committee on Prosthetic Dentistry.

Chairman, S. H. Guilford, Philadelphia, Pa.; L. P. Haskell, 211 Wabash avenue, Chicago, Ill.; A. P. Johnstone, Anderson, S. C.; W. N. Morrison, St. Louis, Mo.; Fred C. Barlow, 646 Jersey avenue, Jersey City, N. J.; J. Hall Lewis, 1309 F street, N. W., Washington, D. C.; A. O. Hunt, Iowa City, Iowa; R. R. Freeman, Nashville, Tenn.; E. S. Gaylord, New Haven, Conn.

No. 16. Local Committee of Arrangements.

Chairman, E. S. Talbot, 125 State street, Chicago, Ill.; F. H. Gardner, 126 State street, Chicago, Ill.; C. N. Johnson, Opera House Building, Chicago, Ill.; D. B. Freeman, 4000 Drexel Boulevard, Chicago, Ill.; H. J. McKellops, 2630 Washington avenue, St. Louis, Mo.

No. 17. Committee on Essays.

Chairman, E. C. Kirk, 1807 Chestnut street, Philadelphia, Pa.; J. W. Wassall, Chicago, Ill.; A. H. Thompson, Topeka, Kan.; H. H. Johnson, 26 Second street, Macon, Ga.; L. G. Noel, Nashville, Tenn.

No. 18. Committee on History of Dentistry in the United States.

Chairman, J. Taft, Cincinnati, O.; Louis Jack, 1315 Locust street, Philadelphia, Pa.; F. T. Van Woert, Brooklyn, N. Y.; F. J. S. Gorgas, Baltimore, Md.; H. L. McKellops, St. Louis, Mo.; E. G. Betty, Cincinnati, O.; J. B. Patrick, Charleston, S. C.

No. 19. Committee on Nomenclature—Not appointed.

No. 20. Committee to Promote the Appointment of Dental Surgeons in the Armies and Navies of the World.

Chairman, M. W. Foster, Baltimore; B. Holly Smith, Baltimore; George Cunningham, Cambridge, England; De Galippe, Paris, France; Adolph Weil, Munich, Bavaria; *J. B. Wilmott, Toronto, Canada; Jno. E. Gievers, Amsterdam, Holland; E. De Trey, Vevey, Switzerland; O. Szigmondy, Vienna; O. Mela, Geneva, Italy; V. Haderup, Copenhagen, Denmark; O. J. Chrustchow, St. Petersburg, Russia; Alex. McG. Denham, Monjitas 68½, Santiago, Chili; George B. Newland, 107 Calle Florida, Buenos Ayres.

No. 21. Committee on Care of the Teeth of the Poor.

Chairman, W. J. Barton, Texas; C. A. Brackett, Newport; *G. S. Dean, San Francisco; T. D. Ingersoll, Erie, Pa.; W. M. Fisher, Dundee, Scotland.

No. 22. Committee on Microscopy and Bacteriology.

Chairman, R. R. Andrews, Cambridge, Mass.; M. H. Fletcher, Cincinnati, O.; W. X. Sudduth, Minneapolis, Minn.; W. D. Miller, Berlin, Germany; J. H. Mummery, London, England; D. E. Caush, Brighton, England; E. Magitot, Paris, France; M. Morgenstern, Baden-Baden, Germany; George S. Allan, New York city.

No. 23. Committee on Prize Essays.

Chairman, Theo. Stanley, Kansas City, Mo.; *J. Hall Moore, Richmond, Va.; C. S. Stockton, Newark, N. J.

No. 24. Editorial Committee.

Chairman, W. W. Walker, New York city; A. O. Hunt, Iowa City, Iowa; L. D. Shepard, Boston, Mass.; J. Taft, Cincinnati, Ohio; J. S. Marshall, Chicago, Ill.

No. 25. Nominating Committee.

Chairman, W. W. Walker, New York city; A W. Harlan, Chicago, Ill.; John S. Marshall, Chicago, Ill.

EDITORIAL.

CO-OPERATION IN DENTAL SOCIETY WORK.

PREPARATIONS which are actively in progress for the holding of state, national, and international dental meetings in the near future suggest the desirability of a consideration of certain points which may lead to greater working efficiency in these organizations. It is assumed that the fundamental differences in the several classes of dental organizations now existing, viz, local, state, and national, are based to a large extent upon a recognition of the principle of division of labor, just as this same principle is utilized in the make-up of any single organization by division of its membership into committees or sections for the better prosecution of its work and more efficient accomplishment of its objects. Or in other words, the various classes of dental organizations are to the profession as a whole, what the sections or committees of a given society are to its aggregate membership. The relation as here stated is not assumed as exactly representing actual conditions, but rather the relations which, all things considered, seem to promise the best working results.

Granting the desirability of such a basis of relationship among the several classes of dental organizations as noted, an essential factor in its achievement is a closer union and harmony of method between the national on the one hand and the state and local organizations on the other, based upon what may be properly termed their functional differences. The limited interest in the meetings of our national associations is probably largely due to the failure to recognize this latter point. The term limited is here used relatively to the whole dental profession, and not in any sense as bearing upon the interest exhibited by those who do attend the meetings. The American Dental Association, by virtue of its name and relation to the various state and local associations, should include in its membership representatives from every minor dental organization in the United States. Otherwise it has not fulfilled its rightful sphere of usefulness. To do this requires not only efficient and intelligent management of its own working methods, but the active co-operation of all other working dental organizations, and, more than all else, the education of every reputable dental practitioner in the land to a belief that his individual interest and effort in promoting the success of the association is part of his professional duty.

Thus far the work of the American Dental Association has been but little different from that of an ordinary local meeting. Its section reports, while they have embodied many individually good papers, have been meager in the sense that they do not represent the consensus of thought held by the dental profession of America, which they would if a closer relation and community of interest among the dental societies of the United States were had and each was fully represented by its quota of delegates.

The work of the American Dental Association should be concerned with the material progress made in the several departments of dentistry during the year, and the reports of the various sections would, in such case, each be an epitome of the best that had been done in a given department. This could without much difficulty be accomplished if the local and state societies would appoint competent committees to furnish reports of all that had been done by their organizations during the year, which reports should be submitted in time to permit of a thorough classification of their contents by the proper sections before the annual meeting. Such a method could not fail to greatly enhance the value of the section reports and produce results of unquestionable value to the societies represented, who, under the plan outlined, would be largely the sources of the scientific and literary material embodied in these.

In such a view it would seem desirable that the local societies defray in whole or part the expenses of their delegates, or at least those who are sent for the first time, as an inducement to secure their attendance ; for which small outlay each local society would receive an adequate return in the benefits derived from a proper representation and the incorporation of the record of its work in the section reports.

The solidarity of the various dental organizations of the United States must result in an increased rate of progress toward the goal of higher professional attainment, and whatever factors tend toward that end should be taken into account. The endless repetition of discussion upon threadbare topics and obsolete methods could be largely eliminated by more systematic study along these lines by a sufficient number of experts, and the formulation of methods from a comparison of results by those competent to undertake the work. Thus, if a list of topics which are discussed at present in a loose, empirical way were prepared by authority of the American Dental Association and copies sent to every local society in the country, with the request that one or more of the suggested topics be discussed at each stated meeting, and at the end of the year a report of the discussions be sent to the secretary of the American Dental Association, they could then be referred by him to the proper sections, whose digested reports would embody the best thought of American dentists on the subjects presented and do much toward settling many questions of practice upon a scientific basis, and help toward the attainment of a rational system in all departments. At the same time it could not fail to increase the harmonious working and interdependence of the present existing classes of dental organizations, by creating a much to be desired community of interest.

DELAYED MATTER.

WE print in this number the list of committees, corrected to date, of the World's Columbian Dental Congress to be held in Chicago in 1893. The large number of dental college commencement notices has compelled a postponement of the publication of much valuable matter, including Periscope, Bibliography, etc., as well as several obituary notices, among others that of Dr. John Allen, who died in Plainfield, N. J., on March 8, in his eighty-second year.

D. HAYES AGNEW, M.D.

THE death of Dr. D. Hayes Agnew, the distinguished surgeon and teacher, occurred at his home in Philadelphia on March 22. A more extended notice concerning him will appear in the DENTAL COSMOS for May.

OBITUARY.

DR. J. FRANCIS FOLTZ.

DIED, in East Boston, Mass., December 3, 1890, J. FRANCIS FOLTZ, D.D.S.

Dr. Foltz was a graduate of the Boston Dental College, in the class of 1876. For some time he practiced his profession in Denver, Col., after which he removed to East Boston, where he remained until his decease. He leaves a widow.

At the annual meeting of the New England Dental Society, of which he was a member, held in Boston, October 29 and 30, 1891, resolutions of respect to the memory of Dr. Foltz were adopted, having been reported by a committee consisting of Drs. George F. Cheney, C. W. Clement, and Edward B. Davis. They recited that the society had lost a beloved brother and friend, whose faithful and earnest work was known throughout the profession; and ordered that the expression of their regret for his loss be entered upon the records of the society, and that a copy of the resolutions be sent to his afflicted family and to the dental journals.

DR. FRED. W. GILLEN.

DIED, at Poughkeepsie, N. Y., January 23, 1892, of typhoid fever, FRED. W. GILLEN, D.D.S., in the thirtieth year of his age.

Dr. Gillen was born in Poughkeepsie, and was educated at the high school of that place. He entered upon the study of dentistry in the office of Dr. T. W. Dubois, of Poughkeepsie, and subsequently matriculated at the New York College of Dentistry, from which institution he graduated in the class of 1882. After graduation he established himself in the practice of his profession at Poughkeepsie.

Dr. Gillen was a skillful operator, and had built up a successful practice. He was a man of integrity, and his genial disposition made him sociably popular and gained for him many and steadfast friends. He was a member of the Alumni Association of the New York College of Dentistry, of the order of Masons, and of several social organizations of his native place.

RESOLUTIONS OF RESPECT TO DRS. JOSEPH A. SWASEY, D. W. RUNKLE, AND REUBEN J. KIRK.

At the semi-annual meeting of the Supreme Chapter of the Delta Sigma Delta Fraternity, held in Chicago, Ill., January 26, 1892, resolutions of respect and condolence were passed in reference to the death of Drs. Joseph A. Swasey, D. W. Runkle, and Reuben John Kirk, late members of that organization.

HINTS AND QUERIES.

Gutta-Percha in Contact with Vital Tissue.—In the conservative practice of his calling the dentist not infrequently faces most perplexing questions, and his ability to properly solve them is the measure of his success.

In the management of pulpless teeth, where there has been extensive removal of tooth-structure by absorption, decay, or mechanical interference, and vital tissue has been laid bare, the question arises, What substance will these tissues best tolerate, in lieu of what has been removed? In substitution, what will best fulfill the office of that which has been lost?

Manifestly this substance must possess certain qualities in a marked degree. It must be non-irritant, non-destructible, not expand or shrink, and yet possess pliability, and also be practically a non-conductor of thermal changes. These terms, as here used, are relative, not absolute. It is not absolutely necessary that it should be therapeutic, but it must be aseptic in its action. What substance at our command most fully meets these requirements, as demonstrated by actual use, and can be relied on in the present status of our knowledge? Is not gutta-percha the sheet anchor?

Only the affirmative side of the question will be here considered.

Often the apical portion of the roots of such teeth as require the nerve-canals to be filled are more or less absorbed, and the foramina enlarged. In those with multiple roots, from their position in the dental arch, it is often a most difficult matter not to force the material used beyond the apex. With any other substance than gutta-percha, it is a question of doubt as to which is the greater of two evils,—to pass beyond the apex, or stop short of it. Either is faulty, and both are failures, and the first a dire calamity. Should this occur with gutta-percha, it will cause less trouble than with any other substance yet used. In such cases, when there is a doubt, give to gutta-percha the benefit of the doubt.

In cases where the drill has passed out at the side of the canal,—which every practitioner of experience knows are most difficult to treat,—nothing will so well suit the case as gutta-percha; and should it pass through and impinge on the adjacent tissues, they will tolerate nothing so well and so continuously. Coming in contact with the peridental membrane, or the vital bony socket by which it is surrounded, less harm will ensue than would result were an open canal left, to gather foreign substances to decompose and bring about an abscess with a fistulous opening and discharge of pus. It is used in two forms,—a solution in chloroform (chloro-percha), and in bulk. In the latter case it is made plastic by heat. A combination of both is useful in most cases.

It is a well-known fact that Nature in most cases makes an effort to remove foreign substances that impinge on vital tissues, producing inflammation. In what manner she does this with this substance, may be questioned. Most likely it is by absorption, and it may be termed in a certain sense a physiological process.

Two cases in point. In the mouth of a young man, twenty-two years of age, the superior central was decrowned by a blow at the age of nine. On presenting, the root was found to be badly decayed, being only a shell. At the first sitting I excised a large tumor at the gum-margin, and a second one, also quite large, protruding down in the enlarged root-canal from the apex. The root was undeveloped, and the opening at the apex quite large, the whole root being a shell only. At the second sitting, on removing the canal-dressing, I could see every pulsation, most distinctly at the apex. I closed the foramen with gutta-percha, and after three days filled the whole tooth with the same material, and at the end of a week mounted a Logan crown, and dismissed the case. No trouble supervened, no inflammation, no disease or semblance of it. After a lapse of two months the conditions are the same. It is my belief that nothing but gutta-percha would have produced such a result. I would not then, and should not now, attempt such an operation in any other way.

In the second case, a young lady of about the same age presented with a badly abscessed superior central incisor. It was a case where the operator had accidentally cut through the side of the tooth in treating an abscess. I cured the abscess at the apex, and filled the opening at the side—which was quite large—with a gutta-percha point dipped in chloro-percha, allowing it to pass slightly through. One month later I filled the tooth permanently. Before this treatment there had been great pain and swelling, which has entirely disappeared, and no further trouble has ensued. I would not have dared to treat in this summary way with any other substance, and rather than have done so would have extracted the offending organ on sight. In these cases, vital tissue must of necessity be impinged on, or at least must be brought in contact with, that which is foreign and non-vital, and yet no trouble follows. Could anything else better subserve the ends to be met, or prove more compatible with the tissues involved? If so, I should gladly adopt it for use in all cases where vital tissue must be encroached upon in the operation of filling or treating teeth.—W. H. H. BARKER, Miller, S. Dakota.

METHOD OF CROWNING.—I was interested in Dr. Stanbrough's comprehensive paper on "Artificial Tooth-Crowns upon the Natural Roots," in the DENTAL COSMOS for January. The doctor enumerated some thirteen different methods, including one of his own, of setting crowns.

The paper suggested to me still another method which I saw used recently, in the office of Dr. D. R. Jennings, of Cleveland, Ohio. It is a modification, a *simplification*, of the method described by Dr. H. F. Maasch in the DENTAL COSMOS for March, 1889. To my mind, Dr. Jennings's plan has advantages over any method which I have yet seen, its simplicity making it preferable in ordinary practice to the Maasch crown.

Briefly described, the process is as follows: Prepare the root as usual, leveling the face of it even with or slightly below the gum. With the Gates-Glidden drills sufficiently enlarge the canal. Now, with a trephine of proper size (those with Dr. Younger's set of implantation instruments will do for most cases), sink a groove between the canal and the periphery of the root. Have the trephine large enough to bring the groove nearer the periphery than the canal (Fig. 1). Sink the groove from a thirty-second to a sixteenth of an inch.

FIG. 1.

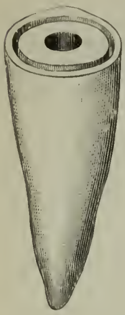
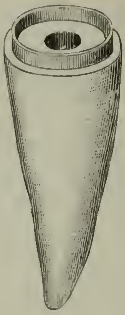


FIG. 2.



Now, on a mandrel of *exactly* the same size as the trephine, fashion a band, preferably of platinum, although gold will answer, sufficiently wide to be set in this groove and project slightly, say a sixteenth of an inch, above the surface (Fig. 2). Solder your band and set with thin cement in the groove. The projecting part will enter the hollow space of the crown. Now set the crown in the usual manner with cement, amalgam, or whatever you use.

By this method it becomes impossible for the root to split. The band must break first. The band projecting into the cement-filled space lends solidity to the whole mass, and besides that, makes an effective dam against the oral secretions getting at the cement around the pin and in the canal. I cannot imagine anything stronger than this, in the way of tooth-crowning.—J. W. VAN DOORN, D.D.S.

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A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

The abbreviations of titles used are those common to bibliographical work, and will, it is presumed, be readily comprehended by any one familiar with dental or scientific publications. Any explanation will be gladly furnished by the compiler. A star (*) indicates a Thesis.

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LIST OF UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING FEBRUARY, 1892.

February 9.—No. 468,653, to G. W. GEITZ. Dental plugger.
" " No. 468,746, to W. S. HOW. Dental pliers.
" " No. 468,761, to E. A. BRYANT. Artificial denture.
February 16.—No. 468,922, to R. G. STANBROUGH. Artificial teeth.
" " No. 468,923, to R. G. STANBROUGH. Dental tool.
" " No. 469,064, to H. MCKAY. Toothpick case.

THE

DENTAL COSMOS.

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ORIGINAL COMMUNICATIONS.

A STUDY OF THE DEGENERACY OF THE JAWS OF THE HUMAN RACE.

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PROFESSOR OF DENTAL SURGERY, WOMAN'S MEDICAL COLLEGE, AND LECTURER ON DENTAL PATHOLOGY AND SURGERY, RUSH MEDICAL COLLEGE.

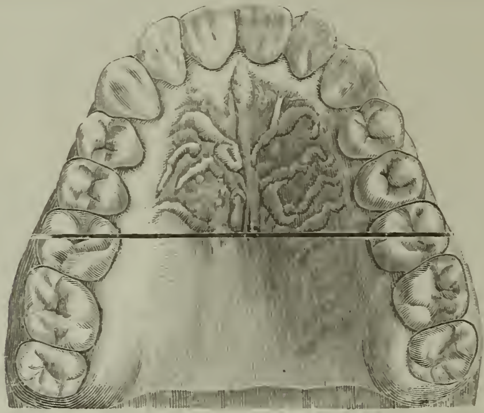
(Continued from page 261.)

EVOLUTIONISTS and scientists have frequently mentioned the fact that the jaws are changing in shape and size, but they have never produced data to show just what changes have taken place. I have therefore collected a large number of measurements for the purpose of obtaining facts in regard to these changes. The measurements of the skulls of the early races, as well as modern people, were made from specimens in the museums and crypts of churches in Europe, where large collections of skulls have been placed. In many of the museums the skulls have been classified and tabulated in such a manner that an examination of them is easily made. The large Hunter collection of skulls at the College of Surgeons in London was examined by the late Mr. John Mummery ; Dr. Betty, of Cincinnati, examined the large collection of skulls at the Smithsonian Institution in Washington ; Dr. C. N. Peirce, of Philadelphia, crania in the Academy of Natural Sciences of that city ; Dr. Schuhmann, of Chicago, crania in Rome, Italy ; Dr. Barrett, of Buffalo, crania in his private collection and in the Buffalo Academy of Natural Sciences ; Dr. Pratt, crania in the Academy of Natural Sciences of Davenport, Ia. ; and I have made examinations of many skulls in different parts of Europe and also of the collection of Peruvian skulls in the Michigan University at Ann Arbor and the Peabody Museum, Harvard College.

Measurements of the jaws of living individuals of different countries and nationalities have been taken by the following dentists as well as by myself : Dr. Caracatsanis, Athens, Greece ; Drs. Franz Berggren and Elof Forberg, Stockholm, Sweden ; Dr. A. Scheller, Warsaw, Poland ; Dr. Johan Kier, Copenhagen, Denmark ; Dr. Sturpenick, Brussels, Belgium ; Dr. Ed. Wagner, North China ; Drs. Perkins and Ivy, Shanghai, China; Dr. D. D. Bode, India; Dr. A. W. Baker, Dublin, Ireland; Drs. W. Barrett and Wm. Hern, London, England; Dr. I. N. Demorest, Santiago, Chile; Dr. Geo. Warren, Philadelphia, Pa.; Dr. R. B. Winder, Baltimore, Md.; Dr. S. D. Hodge, Burlington, Vt.; Dr. W. E. Page, Boston, Mass.; Dr. C. Sill, New York, N. Y.; Drs. Geo. Crisup, Ira Cressiman, Volini, and V. D'Elia, Chicago, Ill. I wish at this point in my paper to thank those gentlemen who so kindly assisted me in the very laborious work of obtaining these measurements, thus contributing their part to the progress of science. The people whose mouths have been examined comprise individuals in the different walks of life, a part of them composing the patients of practitioners of dentistry and constituting the better classes, while others are dispensary patients and from the middle and poorer classes.

The measurement was made across the upper jaw, from the outer surface of one first molar to the outer surface of the corresponding molar of the other side (Fig. 5). These points were taken because these molars are the first teeth of the permanent set to develop, and from the fact that, developing posterior to the temporary ones, they erupt independently of and are not interfered with by any of the other teeth which are in the jaw. The point of the jaw where these teeth are situated is the widest part that is normally developed and is not influenced by local causes, therefore this position was the most accessible for the object required. The measurements were made in the mouths of persons over twenty-five years of age, irrespective of the exact age, for the reason that at this period, or nearly at this period, the individual has completed his growth. After this period the development of the skeleton is very slow, and at the age of thirty to thirty-five ceases altogether.

FIG. 5.



In securing this large collection of measurements of crania and living individuals, the compilation of which has extended over a period of eight years, I have endeavored to show by actual demonstration that the jaw of the human race is diminishing in size.

The following is the table of measurements:

EXAMINATION OF CRANIA

in Peabody Museum, Harvard University; Academy of Natural Sciences, Philadelphia; Davenport Academy; Army Museum; Roman, French, and English Crania in European museums, and private collection of Barrett. Miscellaneous crania by Drs. Peirce, Newton, Schuhmann, Barrett, Pratt, Betty, and Talbot.

RACE.			LATERAL DIAMETER.																						AVERAGE.	
	Inches………		1.88	1.94	2.00	2.06	2.09	2.13	2.16	2.19	2.22	2.25	2.28	2.31	2.34	2.37	2.40	2.44	2.47	2.50	2.56	2.59	2.63	2.69		
	Millimeters.		47.62	49.19	50.80	52.32	53.13	53.95	54.75	55.56	56.35	57.13	57.92	58.84	59.57	60.30	60.90	61.90	62.70	63.50	65.08	65.76	66.67	68.26		
	No.	Sex.																							In.	Mm.
Europeans,—Ancient and Modern Romans, Italians, French, English	276	?	...	1	7	5	...	17	...	15	...	44	...	28	...	57	...	42	...	24	13	...	20	3	2.34	58.84
	36	M.	...	...	...	1	...	12	...	8	...	7	...	5	...	3	...	...	...	...	...	...	...	...	2.20	55.95
	30	F.	3	2	4	6	...	1	...	5	...	7	...	...	...	1	...	1	...	...	...	...	...	...	2.08	52.81
Sandwich Islanders	26	M.	...	...	...	...	...	2	...	3	...	9	...	2	...	6	...	3	...	1	...	...	...	...	2.29	58.17
	26	F.	...	...	...	2	...	8	...	2	...	9	...	4	...	1	...	...	...	...	...	...	...	...	2.20	55.95
	8	?	...	...	...	...	...	...	...	...	2	1	2	2	...	...	...	...	...	1	...	...	...	...	2.30	58.45
Ancient Peruvians	137	M.	...	...	1	8	...	14	...	13	...	31	...	22	...	23	...	17	...	6	1	...	1	...	2.30	58.45
	124	F.	2	...	2	7	...	20	...	22	...	39	...	14	...	10	...	4	...	3	1	...	...	...	2.22	56.34
	117	?	...	...	2	3	2	3	1	12	2	28	8	17	6	10	3	7	3	9	1	...	...	...	2.30	58.45
Ancient Californians, from Santa Cruz Islands, Coast of California, Santa Catalina Island, Brazil, Nicaragua, St. Miguel	34	M.	...	...	...	2	...	2	...	3	...	11	...	...	...	8	...	4	...	2	...	...	2	...	2.31	58.84
	38	F.	...	...	...	1	...	6	...	6	...	13	...	8	...	1	...	3	...	...	...	...	...	...	2.25	57.14
Mexicans	27	?	...	1	...	...	...	1	...	2	2	3	1	5	1	5	...	2	1	3	...	...	...	...	2.31	58.84
Californian Indians	29	M.	...	...	...	1	...	3	...	...	...	8	...	3	...	6	...	3	...	5	...	...	...	...	2.31	58.84
	26	F.	...	...	...	3	...	3	...	7	...	8	...	3	...	2	...	...	...	...	...	...	...	...	2.22	56.34
Mound Builders, Mounds in Kentucky and Tennessee	56	M.	...	...	...	2	...	1	...	6	...	12	...	8	...	15	...	7	...	4	...	...	1	...	2.33	59.48
	47	F.	...	...	1	...	...	3	...	8	...	14	...	7	...	10	...	2	...	2	...	...	...	...	2.28	57.92
	57	?	...	...	...	2	...	1	...	2	...	5	...	10	...	13	...	6	...	8	7	...	2	1	2.39	60.70
Stone Grave People, Cumberland Valley, Tennessee, Illinois River, Indiana, Arkansas, Michigan, and various places	87	M	...	...	...	...	...	1	...	...	...	9	...	10	...	22	...	11	...	22	3	...	7	2	2.42	61.90
	89	F.	1	...	2	...	...	7	...	7	...	31	...	10	...	23	...	6	...	2	...	...	...	...	2.28	57.92
	11	?	...	...	...	...	...	2	...	1	...	2	...	1	...	4	...	1	...	...	...	...	...	...	2.28	57.92
Indians, — North American. Different Tribes	17	M.	...	...	...	...	...	1	...	2	...	6	...	3	...	2	...	1	...	2	...	...	...	...	2.30	58.45
	11	F.	...	...	...	...	...	2	...	1	...	6	...	2	...	...	...	...	...	...	...	...	...	...	2.23	56.69
	191	?	1	...	2	1	1	10	4	20	8	22	14	21	15	16	4	24	7	16	...	3	2	...	2.31	58.84
Negro,—Rio de Favino	1	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2.19	55.56
Total	1501		7	4	21	44	3	120	5	146	14	325	25	185	22	238	7	144	11	110	26	3	35	6		

EXAMINATION OF CRANIA—Continued.

RACE.			LATERAL DIAMETER.																						AVERAGE.	
	Inches		1.75	1.88	1.94	2.00	2.06	2.09	2.13	2.16	2.19	2.22	2.25	2.28	2.31	2.34	2.37	2.44	2.47	2.50	2.53	2.56	2.63	2.75		
	Millimeters		44.46	47.62	49.14	50.80	52 32	53.13	53.95	54.75	55.56	56.35	57.13	57.92	58.84	59.57	60.30	61.90	62.70	63.50	64.29	65.08	66.67	69.85		
	No.	Sex.																							In.	Mm.
Flat Heads from Oregon, Washington, Gulf of Georgia, Peru	3	M.	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	1	...	...	1	...	2.45	62.31
	2	F.	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	2.28	57.92
	18	?	...	...	...	...	...	...	...	...	...	...	2	...	...	...	3	1	...	5	...	...	4	3	2.53	64.29
Crania from San Lorenzo Cave, Mexico	4	M.	...	...	...	...	...	...	...	...	...	...	2	...	1	...	1	...	...	...	...	...	...	...	2.30	58.45
	3	F.	...	...	...	...	...	...	2	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	2.20	55.95
Crania from Caves in Tennessee, Kentucky, Mexico	4	M.	...	...	...	...	...	...	3	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	2.14	54.38
	9	?	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2.23	56.69
	3	F.	...	...	...	...	1	...	...	...	...	...	2	...	...	...	...	...	...	...	...	...	...	...	2 19	55.56
Esquimaux from Labrador, Norton Sound	40	?	1	1	...	2	1	1	4	...	4	3	5	...	2	2	6	1	1	1	1	3	1	...	2.23	56.69
	2	M.	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...	...	...	...	...	...	...	...	2.28	57.92
Hindoos	1	M.	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2.13	53.95
	1	?	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	2.22	56.34
	3	F.	...	...	...	...	1	...	...	...	...	...	1	...	...	...	1	...	...	...	...	...	...	...	2.25	57.14
Herney Islanders	3	M.	...	...	...	...	...	...	...	...	1	...	...	...	1	...	...	...	...	1	...	...	...	...	2.33	59.13
	1	?	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2.13	53.95
Hawaiian Islander	1	M.	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	2.31	58.84
Negroes, African Negroes	2	M.	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	2.31	58.84
	79	?	...	1	1	...	2	1	7	5	7	6	12	8	9	7	7	5	1	...	...	...	...	...	......	57.58
	1	F.	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	2.25	57.14
Zulus, South Africa	1	F.	..	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	2.25	57.14
	1	M.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	2.44	61.90
Probably Africans	2	F.	...	...	...	1	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	2.13	53.95
Negro Giles executed at Richmond, Va.	1	M.	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	2 31	58.45
Aleutian Islander	1	F.	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2.13	53.95
Guanche	1	F.	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2.06	52.58
Pegu, Burmah	1	F.	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	2.19	55.56
Mauritian Dwarf	1	?	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	2.19	55.56
Unknown	3	M.	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	1	...	...	...	...	...	...	2.37	60.30
	5	F.	...	1	...	1	...	...	...	...	1	...	1	...	1	...	...	...	...	...	...	...	...	...	2.13	53.95
Total	197		1	3	1	4	6	2	21	5	16	10	30	8	18	9	20	10	2	9	1	3	6	3		

EXAMINATION OF CRANIA—Continued.

RACE.			LATERAL DIAMETER.																							AVERAGE.	
	Inches......... Millimeters.		1.88 47.62	1.94 49.25	1.97 50.07	2.00 50 80	2.03 51.56	2.06 52.36	2.09 53.13	2.13 53.95	2.16 54.75	2 19 55.56	2.22 56.35	2.25 57.13	2.28 57.92	2.31 58.84	2.34 59.57	2.37 60.30	2.40 60.90	2.44 61.90	2.47 62.70	2.50 63.50	2.53 64.29	2.56 65.08	2.69 68.26		
	No.	Sex.																								In.	Mm.
Fiji Islanders	2	?	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	1	...	...	...	...	...	2.37	60.30
Loo Choo Islander	1	?	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	2.37	60.30
Burmese	1	?	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	2.47	62.70
Marquesas Islanders	4	?	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	2	...	1	...	...	...	...	...	2.36	59.91
Assiniboin	3	?	...	...	...	...	...	...	...	...	...	...	...	...	1	1	...	1	...	...	...	...	...	...	...	2.31	58.84
Kanakee	5	?	...	...	...	...	...	...	...	...	1	...	...	2	...	2	...	...	...	...	...	...	...	...	...	2.25	57.14
Malay	13	?	...	...	...	...	...	...	...	...	1	...	1	...	...	2	...	2	1	3	2	...	1	...	...	2.37	60.30
Tahitian	2	?	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	1	...	...	...	...	2.36	59.91
Tatlit Koochin	2	?	...	...	...	...	...	...	...	...	...	...	1	...	...	...	1	...	...	...	...	...	...	...	...	2.28	57.92
Laplanders	2	?	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	1	...	...	...	2.44	61.90
Japanese	1	?	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	2.37	60.30
Parsee	2	?	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1.98	50.40
Australians	10	?	...	...	...	...	...	...	1	...	...	1	2	1	...	3	...	...	...	...	1	...	...	...	1	2.31	58.84
Armenians	4	?	...	...	...	1	1	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2.06	52.29
Samoan Islander	1	?	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	2.25	57.13
Ancient Egyptian (Egyptian Type)	18	?	1	...	...	2	...	2	1	1	1	1	2	2	...	2	1	...	...	...	1	1	...	...	...	2.20	55.95
Ancient Egyptian (Negroid Type)	11	?	...	...	...	...	...	...	...	2	...	1	...	...	...	...	1	3	1	...	...	2	...	...	1	2.37	60.30
Copt	1	?	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2.13	55.95
Egyptian Negroes	3	?	1	...	...	...	1	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2.01	51.05
Ancient Egyptians	27	?	1	1	3	3	1	5	...	8	3	1	1	...	...	...	...	...	...	...	...	...	...	...	...	2.06	52 59
Arab	2	?	...	...	...	...	...	...	...	...	...	1	...	...	...	1	...	...	...	...	...	...	...	...	...	2.25	57.14
Choctaw and Negro	1	?	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	2.19	55.56
Hispano-Peruvian	2	?	...	...	...	...	...	...	...	1	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	2.17	55.16
Dutch	1	?	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	2.56	65.08
Anglo-American	1	?	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	2.50	63.50
Recent Crania, Pa. (?)	22	?	...	...	1	...	...	...	...	1	...	2	1	4	1	...	...	4	1	3	2	2	...	...	...	2.30	58.45
Total	142		3	1	5	7	3	7	4	15	6	8	9	11	3	12	3	15	3	8	8	7	1	1	2		

EXAMINATION OF CRANIA—Continued.

RACE.	Inches......... Millimeters.		ANTERO-POSTERIOR DIAMETER.																								AVERAGE.	
			1.38	1.50 38.10	1.56 39.69	1.63 41.28	1.64 41.65	1.66 42.11	1.67 42.42	1.69 42.86	1.75 44.46	1.78 45.25	1.81 46.04	1.84 46.83	1.88 47.62	1.91 48.38	1.94 49.14	1.97 50.07	2.00 50.80	2 03 51.56	2.06 52.32	2.10 53.13	2.13 53.95	2.16 54.75	2.19 55.56	2.25 57. 3	2.31 58.69		
	No.	Sex.																										In.	Mm.
Europeans,—Ancient and Modern Romans; Lake Dwellers; French prior to nineteenth century......................	31	M.	...	...	...	. .	...	...	...	4	3	...	7	...	8	...	2	...	7	...	...	...	...	...	...	...	...	1.86	47.23
	30	F.	...	...	1	2	...	...	...	3	4	...	3	...	4	...	5	...	2	...	1	...	...	...	...	...	...	1.83	46.43
Sandwich Islanders...	26	M.	...	...	...	1	...	...	...	1	1	...	4	...	5	...	4	...	6	1	2	...	...	...	1	...	...	1.91	48.38
	29	F.	...	...	...	1	...	...	...	3	6	...	7	...	6	...	2	...	3	1	...	...	...	...	...	...	...	1.83	46.43
Ancient Peruvians....	122	M.	...	...	1	1	...	...	...	6	21	...	20	...	21	...	17	...	27	...	6	...	2	...	...	...	...	1.88	47.62
	104	F.	...	...	4	4	...	...	...	9	22	...	16	...	27	...	16	...	4	...	1	...	1	...	...	...	...	1.79	45.64
	2	?	...	...	...	...	...	...	...	1	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	1.84	46.83
Ancient Californians.	26	M.	...	...	...	1	...	...	...	...	4	...	6	...	5	...	2	...	2	...	5	...	1	...	...	...	...	1.89	48.02
	32	F.	...	...	...	...	...	...	...	1	7	...	7	...	7	...	3	...	6	...	1	...	...	...	...	...	...	1.86	47.23
	130	?	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1.83	46.40
Californian Indians...	32	M.	...	...	...	...	...	...	...	1	5	...	2	...	4	1	8	...	9	...	1	...	1	...	...	...	...	1.91	48.38
	30	F.	..	...	...	...	...	...	...	2	6	...	9	...	8	2	2	...	1	...	...	...	...	...	...	...	...	1.83	46.43
Mound Builders........	157	M.	...	...	1	1	...	...	...	...	8	...	15	...	25	...	18	7	32	5	12	7	14	3	3	...	1	2.00	50.80
	83	F.	...	...	...	1	...	...	...	3	6	...	15	...	15	...	10	4	16	1	7	...	4	...	...	...	...	1.89	48.c2
	1	?	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	2.00	50.80
Stone Grave People, Cumberland Valley.	83	M	...	...	...	1	...	...	...	3	3	...	10	...	7	...	14	...	21	...	13	...	6	...	4	1	...	1.97	50.00
	80	F.	...	...	...	1	...	...	...	2	9	...	14	...	16	...	11	...	21	...	6	...	...	...	...	...	...	1.91	48.41
	7	?	...	...	...	...	...	...	...	...	...	..	...	...	3	...	2	...	2	...	...	...	...	...	...	...	...	1.94	49.21
Indians......................	110	M.	...	...	...	...	...	...	...	...	4	...	5	...	15	2	10	4	22	6	20	10	14	...	4	3	1	1.99	50.55
	58	F.	1	1	...	...	1	2	1	...	5	1	4	1	10	1	5	...	11	1	6	3	...	2	...	1	1	1.87	47.44
	3	?	...	...	...	...	...	...	...	...	...	...	2	...	...	...	...	...	1	...	...	...	...	...	...	...	...	1.91	48.38
Negro,—Rio de Favino.	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	2.06	52.32
Total......................	1177		1	1	7	14	1	2	1	39	114	1	146	1	186	6	132	15	194	15	82	20	43	5	12	5	3		

EXAMINATION OF CRANIA—Continued.

RACE.	Inches ...... Millimeters		ANTERO-POSTERIOR DIAMETER.											AVERAGE.	
			1.63 41.28	1.69 42.86	1.75 44.46	1.81 46.04	1.88 47.62	1.94 49.14	2.00 50.80	2.06 52.32	2.13 53.95	2.19 55.56	2.25 57.13		
	No.	Sex.												In.	Mm.
Flat Heads from Oregon, Washington, Gulf of Georgia, Peru.....	3	M.	...	...	...	...	2	...	...	...	...	...	1	2.00	50.80
	2	F.	...	...	...	...	1	...	1	...	...	...	...	1.94	49.21
	1	?	...	...	...	...	...	...	1	...	...	...	...	2.00	50.80
Crania from San Lorenzo Cave, Mexico	4	M.	...	1	...	2	...	...	1	...	...	...	...	1.83	46.43
	3	F.	...	...	1	1	...	1	...	...	...	...	...	1.83	46.43
Crania from Caves in Tennessee, Kentucky, Mexico	4	M.	...	1	...	2	1	...	...	...	...	...	...	1.79	45.64
		?	...	...	...	...	...	...	...	...	...	...	...	......	....
	3	F.	...	...	2	...	...	...	1	...	...	...	...	1.83	46.43
Esquimaux from Labrador, Norton Sound		?	...	...	...	...	...	...	...	...	...	...	...	......	....
	7	M.	...	1	1	1	1	2	...	...	1	...	...	1.72	43.65
Hindoos	4	M.	...	1	1	...	1	...	1	...	...	...	...	1.69	42.86
		?	...	...	...	...	...	...	...	...	...	...	...	......	....
	2	F.	...	...	...	2	...	...	...	...	...	...	...	1.81	46.04
Herney Islanders	3	M.	...	...	...	...	2	...	1	...	...	...	...	1.92	48.81
		?	...	...	...	...	...	...	...	...	...	...	...	......	....
Hawaiian Islander	1	M.	...	...	...	...	...	...	1	...	...	...	...	2.00	50.80
Negroes, African Negroes	2	M.	...	...	...	...	...	...	...	1	1	...	...	2.09	53.18
		?	...	...	...	...	...	...	...	...	...	...	...	......	....
		F.	...	...	...	...	...	...	...	...	...	...	...	......	....
Zulus, South Africa	1	F.	...	...	...	...	...	1	...	...	...	...	...	1.94	49.21
	1	M.	...	...	...	...	...	...	1	...	...	...	...	2.00	50.80
Probably Africans		F.	...	...	...	...	...	...	...	...	...	...	...	......	....
Negro Giles executed at Richmond, Va.	1	M.	...	...	...	...	...	...	...	...	...	1	...	2.19	55.56
Aleutian Islander	1	F.	...	...	...	...	...	...	...	...	1	...	...	2.13	53.98
Guanche	1	F.	1	...	...	...	...	...	...	...	...	...	...	1.63	41.28
Pegu, Burmah	1	F.	...	...	...	...	1	...	...	...	...	...	...	1.88	47.62
Mauritian Dwarf	1	?	...	...	...	...	...	...	...	...	1	...	...	2.13	53.98
Unknown	3	M.	...	...	...	1	...	...	1	1	...	...	...	1.95	49.60
	5	F.	...	1	...	...	1	1	2	...	...	...	...	1.91	48.41
Total	54		1	5	5	9	10	5	11	2	4	1	1		

EXAMINATION OF CRANIA—Continued.

RACE.			ANTERO-POSTERIOR DIAMETER.																	AVERAGE.	
		Inches.........	1.56	1.75	1.81	1.84	1.88	1.91	1.94	2.00	2.01	2.03	2.06	2.09	2.13	2.16	2.19	2.25	2.28		
		Millimeters.	39.69	44.46	46.04	46.74	47.62	48.23	49.25	50.80	51.05	51.56	52.32	53.19	53.95	54.75	55.56	57.13	57.92		
	No.	Sex.																		In.	Mm.
Fiji Islanders	1	M.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	2.28	57.92
	1	F.	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	2.09	53.19
Bavarian	1	M.	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	2.13	53.95
	1	F.	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1.81	46.04
New Zealanders	3	M.	1	...	...	...	...	...	...	...	...	1	...	...	1	...	...	...	...	1.92	48.76
	3	F.	...	1	...	...	...	...	...	...	1	1	...	...	...	...	...	...	...	1.93	49.00
Austrians	3	M.	...	...	...	...	...	...	2	1	1	...	...	...	...	...	...	...	...	1.96	49.78
	3	F.	...	1	...	...	...	1	...	...	...	...	...	...	1	...	...	...	...	1.94	49.25
Chinese	1	M.	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	2.09	53.19
	1	F.	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	1.94	49.25
Japanese	1	M.	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	1.91	48.23
	1	F.	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	2.06	52.32
Australians	1	M.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	2.25	57.13
	2	F.	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	2.01	51.05
Samoan Islander	1	M	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	1.94	49.25
Gallo-Roman	1	M.	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	2.00	50.80
	1	F.	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	1 88	47.62
Romano-British	1	F.	...	...	...	1	...	...	...	...	...	...	...	...	...	...	..	...	...	1.84	46.74
Whites	3	M.	...	1	...	...	...	...	...	...	...	...	1	...	1	...	...	...	...	1.98	50.29
	1	F.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	2.19	55.56
Egyptian	1	F.	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1.81	46.04
American Negroes	3	M.	...	...	...	...	...	...	...	...	...	1	...	...	...	1	1	...	...	2.13	53.95
	3	F.	...	...	...	...	...	...	...	...	...	...	2	...	1	...	...	...	...	2.08	52.73
Total	38		1	4	2	1	1	2	4	2	2	3	4	2	5	1	2	1	2		

EXAMINATION OF CRANIA—Continued.

RACE.			HEIGHT OF VAULT.																	AVERAGE.	
	Inches.......... Millimeters...		.25 6.35	.31 7.62	.37 9.39	.41 10.45	.44 11.17	.47 11.93	.50 12.70	.53 13 46	.56 14.23	.59 14 98	.63 16.	.66 16.78	.69 17.52	.72 18.29	.75 19.05	.81 20.57	.88 22.35		
	No.	Sex.																		In.	Mm.
Europeans,—Ancient and Modern Romans; Lake Dwellers; French prior to nineteenth century......................	34	M.	1	...	1	2	7	3	9	2	5	1	3	...	2	...	...	...	...	.53	13.46
	30	F.	...	1	1	...	9	1	13	1	3	...	1	...	...	...	...	...	...	.48	12.19
Sandwich Islanders..	25	M.	...	...	1	...	3	...	7	...	5	...	6	1	1	...	1	...	...	.55	13.97
	26	F.	...	1	1	...	4	...	6	1	8	1	3	...	1	...	...	...	...	.52	13.21
Ancient Peruvians....	137	M.	1	...	1	1	11	2	25	10	29	9	20	4	16	2	4	2	...	.57	14.47
	124	F.	...	...	4	1	13	1	27	6	29	7	19	6	8	...	3	...	...	.57	14.47
	17	?	...	...	...	...	6	...	8	...	1	...	2	...	...	...	...	...	...	.49	12.45
Ancient Californians.	34	M.	...	...	...	...	4	1	6	2	11	1	7	1	1	...	...	...	...	.55	13.97
	38	F.	...	...	...	...	4	1	6	5	14	2	4	...	1	...	1	...	...	.55	13.97
Californian Indians...	29	M.	...	...	...	1	5	...	5	...	10	2	5	...	1	...	...	...	...	.54	13.71
	26	F.	...	...	...	...	6	1	7	2	7	...	2	...	1	...	...	...	...	.52	13.21
Mound Builders.......	56	M.	...	...	...	...	1	...	14	2	14	3	14	1	4	3	...	...	...	.55	13.97
	47	F.	...	...	...	...	7	1	5	5	12	2	12	1	2	...	...	...	...	.56	14.23
	7	?	...	...	...	1	2	...	1	1	...	1	...	1	...	...	...	...	...	.51	12.95
Stone Grave People, Cumberland Valley.	87	M.	...	...	...	1	4	1	10	8	12	6	19	8	9	3	4	1	1	.60	15.02
	89	F.	...	...	1	2	10	5	11	10	19	3	21	3	2	...	2	...	...	.55	13.97
	11	?	...	...	1	...	2	1	2	1	4	...	...	...	...	...	...	...	...	.50	12.70
Indians.....................	17	M.	...	...	...	...	1	...	3	1	2	5	4	...	1	...	...	...	...	.57	14.47
	11	F.	...	...	...	3	1	5	...	1	...	1	...	...	...	...	...	...	...	.47	11.93
	3	?	...	...	...	...	...	...	1	...	1	...	1	...	...	...	...	...	...	.56	14.23
Negro,—Rio de Favino....................	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	.50	12.70
Total......................	859		2	2	11	12	100	23	166	58	186	44	143	26	50	8	15	3	1		

EXAMINATION OF CRANIA—Continued.

RACE.			HEIGHT OF VAULT.											AVERAGE.	
	Inches........		.31	.44	.47	.50	.53	.56	.59	.63	.66	.69	.75		
	Millimeters		7.62	11.17	11.93	12.70	13.46	14.23	14.98	16.00	16.78	17.52	19.05		
	No.	Sex.												In.	Mm.
Flat Heads from Oregon, Washington, Gulf of Georgia, Peru.....	3	M.	...	...	...	1	...	...	...	...	...	1	1	.65	16.51
	2	F.	...	...	...	1	...	1	...	...	...	...	...	.53	13.46
	1	?	...	...	...	1	...	...	...	...	...	...	...	.50	12.70
Crania from San Lorenzo Cave, Mexico	4	M.	...	...	...	1	...	1	...	1	...	1	...	.60	15.02
	3	F.	...	1	...	...	1	...	...	...	1	...	...	.54	13.71
Crania from Caves in Tennessee, Kentucky, Mexico	3	M.	...	...	...	...	3	...	...	...	...	...	...	.53	13.46
		?	...	...	...	...	...	...	...	...	...	...	...	....	....
	3	F.	...	...	1	...	2	...	...	...	...	...	...	.51	12.95
Esquimaux from Labrador, Norton Sound		?	...	...	...	...	...	...	...	...	...	...	...	....	. .....
	2	M.	...	...	...	1	...	1	...	...	...	...	...	.53	13.46
Hindoos..	1	M.	...	...	...	1	...	...	...	...	...	...	...	.50	12.70
		?	...	...	...	...	...	...	...	...	...	...	...	....	....
	3	F.	...	1	...	...	...	...	...	1	...	1	...	.60	15.02
Herney Islanders.........................	3	M.	...	1	...	...	...	...	...	2	...	...	...	.57	14.47
		?	...	...	...	...	...	...	...	...	...	...	...	....	....
Hawaiian Islander.............................	1	M.	...	...	...	...	...	...	...	1	...	...	...	.63	16.00
Negroes, African Negroes............	2	M.	...	...	...	...	1	...	...	1	...	...	...	.57	14.47
		?	...	...	...	...	...	...	...	...	...	...	...	....	....
	1	F.	...	1	...	...	...	...	...	...	...	...	...	.44	11.17
Zulus, South Africa...........	1	F.	...	...	...	1	...	...	...	...	...	...	...	.50	12.70
	1	M.	...	...	...	...	...	...	...	...	...	...	1	.75	19.05
Probably Africans	2	F.	...	1	...	1	...	...	...	...	...	...	...	.47	11.93
Negro Giles executed at Richmond, Va	1	M.	...	...	...	1	...	...	...	...	...	...	...	.50	12.70
Aleutian Islander..............................	1	F.	1	...	...	...	...	...	...	...	...	...	...	.31	7.62
Guanche	1	F.	...	1	...	...	...	...	...	...	...	...	...	.44	11.17
Pegu, Burmah......................................	1	F.	...	...	...	1	...	...	...	...	...	...	...	.50	12.70
Mauritian Dwarf.................................	1	?	...	...	...	1	...	...	...	...	...	...	...	.50	12.70
Unknown.................	3	M.	...	...	...	...	2	1	...	...	...	...	...	.54	13.71
	5	F.	...	...	...	...	3	...	1	...	...	1	...	.57	14.47
Total..	49		1	6	1	11	12	4	1	6	1	4	2		

EXAMINATION OF THE CRANIA

of Modern Races and Ancient Races in the Hunterian Museum by Dr. Mummery.* Also crania in the Oxford University Museum, and in a number of private collections.

MODERN RACES.	No.	LATERAL DIAMETER. Minimum. In.	Minimum. Mm.	Maximum. In.	Maximum. Mm.
Esquimaux	69	2.375	60.32	2.75	69.85
N. Americans (Coast)	56	2.375	60.32	2.75	69.85
N. Americans (Interior)	23	2.375	60.32	2.625	66.68
S. Americans (Chile)	19	2.50	63.50	2.75	69.85
Fiji Islanders	38	2.50	63.50	2.875	73.02
Polynesians (Various)	79	2.375	60.32	2.625	66.68
Sandwich Islanders	21	2.375	60.32	2.625	66.68
New Zealanders	67	2.50	63.50	2.875	73.02
Australians	132	2.375	60.32	2.75	69.85
Tasmanians	33	2.375	60.32	2.625	66.68
Malays.	24	2.375	60.32	2.75	69.85
Chinese	27	2.25	57.14	2.625	66.68
East Indians (North)	152	2.25	57.14	2.75	69.85
East Indians (South)	71	2.125	53.97	2.50	63.50
Africans (East)	33	2.125	53.97	2.75	69 85
Caffres	49	2.375	60.32	2.875	73.02
Bosjesmen and Hottentots	29	2.125	53.97	2.375	60.32
Africans (West)	236	2.25	57.14	2.75	69.85
Ashantees	92	2.50	63.50	2.875	73.02
Total No.	1250				

ANCIENT RACES.	No.	LATERAL DIAMETER. Minimum. In.	Minimum. Mm.	Maximum. In.	Maximum. Mm.
Ancient Britons (Dolichocephalic	68	2.125	53.97	2.625	66.68
Ancient Britons (Brachycephalic)	32	2.125	53.97	2 50	63.50
Ancient Britons (Canon Greenwell's Explorations)	59	2.125	53.97	2.50	63.50
Ancient Britons (Miscellaneous)	44	2.125	53.97	2.50	63.50
Romano-Britons	143	2.125	53.97	2.625	66.68
Anglo-Saxons	76	2.25	57.14	2.625	66.68
Ancient Egyptians	36	2.125	53.97	2.625	66 68
Total	458				

RACE.	ANTERO-POSTERIOR. Inches .... Millimeters. No.	1.75 44.46	2. 50.80	2.07 52.29	AVERAGE. In.	AVERAGE. Mm.
Marshpee Indians	34	6	17	11	1.98	50.27

RACE.	HEIGHT OF VAULT. In. Mm. No.	.41 10.45	.50 12.70	.59 14.98	.63 16.	AVERAGE. In.	AVERAGE. Mm.
Marshpee Indians	46	9	25	4	8	.51	12.95

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* These measurements were made about 1860. These being the first made, only the maximum and minimum figures are given, instead of presenting the entire measurements in a table, which would have been more scientific

EXAMINATION OF THE MOUTHS OF LIVING PERSONS, SHOWING MEASUREMENTS OF LATERAL DIAMETER OF THE SUPERIOR MAXILLA.

RACE.	Inches……. Millimeters		LATERAL DIAMETER.																								AVERAGE.	
	No.	Sex.	1.75 44.46	1.88 47.62	1.94 49.25	1.97 50.02	2.00 50.80	2 02 51.3	2.05 52.07	2.07 52.50	2.09 53.19	2.13 53.95	2.15 54.6	2.17 55 16	2.20 56.00	2.25 57.13	2.28 57.92	2.31 58 84	2.34 59.57	2 37 60.30	2.40 61.00	2.44 62.00	2.46 62.5	2.48 63.00	2.52 64.00	2.56 65.00	2 60 66.00	2.63 66.67	In.	Mm.
Residents of Athens, Greece	15	M.	1	1	2	4	1	4	1	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1.98	50.40
	14	F.	4	5	3	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1.90	48.23
Stockholm, Sweden	393	M.	...	2	6	19	...	7	11	...	23	30	...	28	36	51	33	35	...	30	20	23	...	12	7	8	6	6	2.26	57.37
	194	F.	3	3	8	16	...	18	11	...	13	25	...	15	13	25	19	12	...	9	1	1	...	...	1	...	1	...	2.15	54.6
Copenhagen, Denmark	250	M.	1	4	...	6	...	5	11	...	18	12	...	32	24	21	24	25	...	50	...	...	11	...	...	6	...	...	2.24	56.82
	50	F.	1	1	...	2	...	1	6	...	4	6	...	2	11	7	6	...	...	2	...	...	1	...	...	...	...	...	2.18	55.72
Brussels, Belgium	148	M.	...	...	...	2	...	...	...	...	10	6	3	...	22	14	23	14	1	25	7	5	3	1	1	1	...	...	2.25	57.05
	158	F.	2	...	1	4	...	3	8	1	20	6	14	20	19	18	19	6	1	8	3	1	...	1	1	1	1	...	2.18	55.57
Warsaw, Poland	150	M.	...	...	...	...	...	1	1	...	...	...	5	5	11	16	23	28	...	24	14	10	...	7	3	1	1	...	2.31	58.84
	150	F.	...	...	2	4	...	5	12	...	19	...	19	24	12	14	18	...	18	...	3	...	...	...	...	...	...	...	2.17	55.16
China	72	M.	...	...	...	...	10	...	...	...	...	9	...	2	1	9	7	7	...	17	6	4	...	...	...	...	...	...	2.26	57.37
	22	F.	...	...	...	...	6	...	...	...	...	3	...	...	2	3	3	2	...	2	...	...	...	...	1	...	...	...	2.19	55.56
Typical People of India	46	M.	...	...	2	...	6	...	...	6	...	15	...	...	9	6	...	1	...	1	...	...	...	...	...	...	...	...	2.13	53.95
	3	F.	...	...	1	...	1	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2.00	50.80
Italians	666	M.	...	...	11	...	17	...	...	300	...	75	...	...	41	48	...	79	...	23	...	19	...	20	20	6	...	7	2.17	55.16
	189	F.	...	44	41	...	56	...	...	17	...	15	...	...	2	8	...	5	...	...	...	1	...	...	...	...	...	...	2.00	50.80
Santiago, Chile	106	M.	4	...	...	9	5	...	8	...	15	5	...	15	7	12	4	4	7	...	2	...	...	...	...	...	...	...	2.11	53.57
	154	F.	20	12	1	25	14	...	25	...	9	5	...	23	3	...	4	5	8	...	...	...	...	...	...	...	...	...	2.04	51.78
London, England	203	M.	...	1	1	...	7	...	...	15	...	31	...	...	26	29	...	30	...	22	...	15	...	6	5	9	...	8	2.28	57.92
	187	F.	...	8	19	...	29	...	...	40	...	33	...	...	20	15	...	7	...	4	...	2	...	...	...	...	...	...	2.09	53.19
Dublin, Ireland	86	M.	...	3	4	...	2	...	...	5	...	10	...	...	12	17	...	6	...	18	...	3	...	3	2	...	...	1	2.25	57.13
	126	F.	...	8	10	...	25	...	...	17	...	23	...	...	7	21	...	8	...	5	...	...	...	1	1	...	...	...	2.11	53.58
American-born Negroes	128	M.	...	...	...		...	...	...	3	...	11	...	...	11	0	...	33	...	47	...	10	...	4	3	...	...	...	2.32	58.92
	108	F.	...	...	...	3	1	...	...	17	...	5	...	...	33	35	...	17	...	...	...	...	...	...	...	...	...	...	2.20	55.9
Dispensary patients of Philadelphia, Baltimore, and Boston	463	M.	...	7	7	3	60	...	...	115	...	101	...	...	70	47	...	20	...	21	...	4	...	4	2	2	...	...	2.14	54.33
	241	F.	12	38	42	...	56	...	...	28	...	23	...	...	13	13	...	3	...	7	...	1	...	...	1	...	...	1	2.01	50 9
Residents of Burlington, Vt.	52	M.	...	...	...	60	7	...	...	6	...	8	...	...	9	11	...	6	...	5	...	...	...	...	...	...	...	...	2.19	55.56
	50	F.	...	5	9	...	11	...	...	10	...	8	...	...	7	...	...	...	...	...	...	...	...	...	...	...	...	...	2.02	51.31
Boston, Mass.	896		...	...	76	...	180	170	...	164	50	160	...	1	34	...	...	1	...	...	...	...	...	...	...	...	...	...	2.04	51.80
New York City	47	M.	1	1	...	...	2	...	...	4	...	12	...	...	11	9	...	4	...	1	...	1	...	...	1	...	...	...	2.18	55.72
	56	F.	2	3	2	...	8	...	...	9	...	10	...	...	8	7	...	3	...	2	...	...	...	...	1	...	...	...	2.10	53.36
Chicago	51	M.	...	...	...	...	2	...	...	5	...	12	...	...	7	5	...	11	...	7	...	1	...	...	...	1	...	...	2.22	56.34
	51	F.	...	1	3	...	8	...	...	5	...	15	...	...	6	14	...	8	...	1	...	...	...	...	...	...	...	...	2.14	54.33
Chicago and Illinois	1696	M.	8	19	122	...	163	...	...	316	...	352	...	...	211	197	...	173	...	19	...	12	...	2	2	...	...	...	2.12	53.76
	1116	F.	1	31	146	...	342	...	...	292	...	147	...	...	27	21	...	5	...	1	...	...	...	2	1	...	...	...	2.02	51.31
Marshpee Indians	55	M.	...	...	...	...	12	...	...	6	...	...	...	...	9	10	...	...	...	...	...	...	...	9	9	...	...	...	2.24	56.90
	6	F.	...	...	...	...	...	...	...	6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2.07	52.5
	8398		60	97	519	158	1031	215	94	1388	181	1144	41	167	734	709	183	558	35	351	56	113	15	72	62	35	9	23		

While one would naturally expect to find discrepancies in the figures in a work like this, in which so many different individuals have been engaged, great care was exercised in selecting gentlemen (most of whom are personal friends of mine and well known in the profession) who possessed skill and who had also attained prominence in their calling.

In comparing the measurements of living individuals with those of the crania, an allowance of .06 of an inch should be made for thickness of the mucous membrane.

The measurements have been given in detail, with the exception of those of the late Dr. Mummery, who reported only the maximum and minimum measurements. I regret that these were not given in detail. A table containing only the maximum and minimum and average measurements would be of less value to scientists, who prefer to compare the differences themselves. The difference in the number of measurements of the antero-posterior and the lateral diameter is due to the fact that in many cases the antero-posterior diameter was taken from the first and second molars instead of from the third; it was necessary to reject all such measurements.

We must therefore look upon these figures as being nearly correct in each individual case, because the work is positive in its nature, and the figures are simply a matter of record as presented by the instrument.

Mouths of Living Persons—Lateral Diameter.

A careful study of the table will show that the diameter of the jaws depends to a great extent upon the size of the skeleton; thus a small person will possess a small jaw, a large person a large jaw. This, however, is not invariable. We frequently find small people with large jaws, like the Cretins of Switzerland, and large people with small jaws, as is frequently observed in limestone countries. This condition is also frequently due to excessive or arrested development of the maxillæ. We notice that there is as marked a difference between the size of the jaws of the male and female as there is in the size of the skeleton of the two sexes. This difference ranges from .02 to .16 of an inch, and is characteristic not only of living individuals, but it was also observed in the measurements of the crania of the ancient races.

We also note that the lateral diameter of the jaws of living persons in the old country is greater, with the exception of the Athenians, than it is in this country at the present time, and the jaws of the native Indian races of this country are much larger than the jaws of the white people at the present time. The jaws of the people in older parts of this country are smaller than the jaws of people in the newer parts, as illustrated in the measurements of the jaws of the residents of Boston and those of Chicago.

There is also a marked difference between the diameters of the jaws of dispensary patients and poorer patients, and those observed in private practice among the wealthier classes. This is well illustrated in the measurements of patients by Dr. Cressiman and those measured by the author. The patients of Dr. Cressiman belong to the middle class, and many of them are of foreign birth, either German or Swede.

This is also well illustrated in measurements by the author, of patients in the office of Dr. Shepard, of Boston, and those made by Dr. W.

E. Page, of Boston, Dr. Winder, of Baltimore, and Dr. Warren, of Philadelphia, who made examinations of dispensary patients. A very interesting point to be noticed is that the purer and more clannish the race, the smaller the range in the figures representing the diameters of the jaws.

Thus we see in the measurements of the jaws of the Chinese the range is only from 2 to 2.44, with one measurement at 2.52; the people of India, 1.94 to 2.37; the negro, 2.07 to 2.50; the Marshpee Indians, 2.00 to 2.50; while in the mixed races the range is from 1.50 to 2.75, extending over a much greater latitude than in the pure races. Thus in the Swedes we notice that the range is from 1.81 to 2.63; in Dublin from 1.88 to 2.50; in London from 1.88 to 2.44; while the range of the white people in America is from 1.50 to 2.63. This disparity in the size shows that in mixed races and those of a nervous temperament the arrest of development and excessive development of the jaws are very common; while on the other hand, in those races whose customs have been the same for hundreds of years, where the soil, climate, and environments have been unchanged, who have intermarried among themselves, very little difference in the size of the jaws is noticed. There is also a difference noticed in people who live at different heights of the same country, as in Northern and Southern Italy and in different parts of America.

It is not necessary to take measurements of different nationalities to show that the jaws are diminishing in size, but simply compare the measurements of the jaws of the same nationality at different periods of its history. Thus the early Briton possessed jaws which measured from 2.12 to 2.50 in their lateral diameters, while the jaws of the present English people measure from 1.88 to 2.44 inches. It will be noticed that the minimum diameter has decreased more than the maximum. Again, by comparing the ancient Romans with the modern Italians of Southern Italy, we find that the jaws of the early Romans measured from 2.12 to 2.62, while the jaws of the present Southern Italians measure only 1.94 to 2.69.

In comparing the measurements of the uncivilized races with those of the civilized, it will be observed that the jaws of the former are much larger than those of the latter. In the majority of cases the size and shape of the jaw are commensurate with the osseous structure of the individual. The Bosjesmen and Hottentots present the smallest range in the size of the jaw, 2.12 to 2.37 inches. As is well known, they are the most inferior of races (with the exception of the Australians), mentally and physically. They are nomadic in habit, and are often driven from place to place by stronger tribes. Their food often consists for some time of herbs, roots, berries, plantain, etc. Their meat consists chiefly of rats, dogs, etc., and they are obliged sometimes to feed upon locusts, ants, lizards, and frogs. This mode of life is as artificial in one direction as is the life of the present highly civilized races in the opposite direction. The people dwell along the banks of rivers, near marshes, where hygienic surroundings are wanting.

The Chinese live under artificial conditions also, and the size of their jaws ranges from 2.25 to 2.62 inches. Of the East Indians, those living in the north are of tall stature and well developed. They live on the high plateaus, while those in the south live in valleys. The physical development of the latter is less, and their maxillæ are smaller than the former.

The Esquimaux are of short stature, but of remarkably well developed physique. Their maxillæ are large in proportion to the osseous development.

The Australians are the lowest types of mankind, and their jaws range from 2.37 to 2.75 inches. The jaws are very large in proportion to the size of the cranium. The Fiji Islanders and the New Zealanders are among the best developed, physically, of any of the races, past or present. Their jaws are large, ranging from 2.50 to 2.75 inches. Very few cases of caries were found by Dr. Mummery. The Polynesians and Sandwich Islanders are slightly inferior to the former, and we find this inferiority marked in the jaws also.

The South Americans from Chile, occupying the western side of the Andes, are descended from Spanish and Indian ancestors. Their teeth are very large. The North American Indians present very large jaws. They are well developed physically also. Among the ancient Britons, we would expect to find that the dolichocephalic maxillæ were narrower in proportion to the length, and the brachycephalic maxillæ broader. The length of the maxillæ has not been given, consequently the relative proportion of length and breadth cannot be determined, but we notice that the maximum brachycephalic jaw is 2.50 inches, while that of the dolichocephalic is 2.75 inches. The brachycephalic Britons were more civilized than the former, and lived under more artificial conditions, which fact will help sustain the theory advanced by me that the higher civilization is attended with lessened development of the maxillæ.

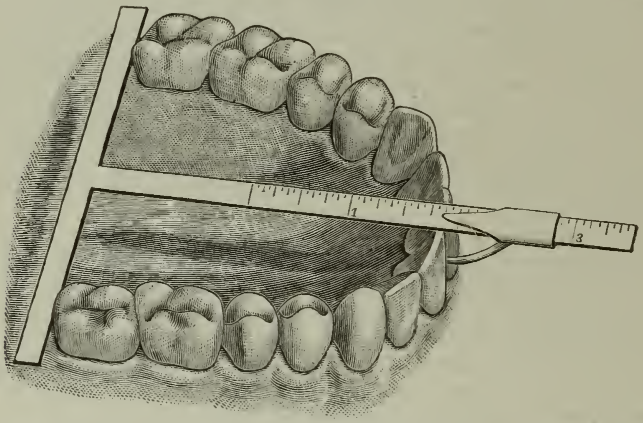
Comparing the ancient races with the modern races, we find the range of the former is 2.12 to 2.62 inches, while that of the modern is 2.12 to 2.87 inches. Only three of the modern races, however, have a minimum of 2.12, while the minimum of all the ancient races, with the exception of the Anglo-Saxons, is 2.12 inches. The maximum of the ancient races is less than that of the former. This fact, that the jaws of these people are smaller than those of the modern races, is another proof of the truth of the theory that civilization is accompanied by decrease in the size of the jaws; for these ancient races were possessed of a higher civilization than the modern races, who with few exceptions are in a state of barbarism.

Antero-Posterior Diameter.

The antero-posterior diameter was taken from the alveolar process at a point between the central incisors extending backward in the median line and meeting a line drawn at right angles to the posterior surface of the third molar, as illustrated in Fig. 6.

It is a singular fact that the same laws hold good for the development of the antero-posterior diameter that were laid down for the lateral diameter. Although these examinations were made by different persons in different parts of the country, we find that the antero-posterior diameter of the jaw of the female is less than that of the male by from .02 to .24 of an inch. This disparity, as compared with that of the lateral diameters, is a natural one. After the temporary teeth are all in place, the natural development of the jaw is in an antero-posterior direction, and the natural changes that are taking place in the evolution of the face and jaws consist of a shortening of the antero-posterior diameter. The great range of difference is due to the fact that it is quite common to find in some individuals an entire arrest of development of the posterior part of the body of the jaw. This is always the case when permanent molars have been extracted, thus allowing the third molar to come forward, or when the individual has inherited the large jaw of one parent and the small teeth of the other parent, or when the jaws have become arrested in development from constitutional disease. In comparing the antero-posterior diameter of the jaws of people of one nation with those of another nation, we must take into consideration the character of the skull. In the brachycephalic type of the Chinese we find the broad jaw, and in the dolichocephalic type of the negro, the long jaw. This difference, however, is only applicable to the pure races, and can be noticed only by comparing the external condition of the head or skull with the jaw. If we were to examine two or three thousand plaster casts of the mouths of a mixed class of people, we would be unable to say that this one belonged to a brachycephalic individual and that one belonged to a dolichocephalic individual. The local conditions so modify the shape of the jaw that in the mixed classes there is not that correlation between the shape of the skull and jaw which we find in the pure races. The fact that the jaw develops or lengthens from before backward would naturally impress one with the fact that if the jaws were not exercised by mastication, or if any of the permanent teeth had been extracted, or if a third molar failed to make its appearance, the length required would necessarily be much less than that required by a jaw full of teeth and one that had been well exercised. Therefore nature developed only the posterior part of the jaw, that which is actually necessary, and hence the short lower jaw.

Fig. 6.



The Third Molar.

I have frequently observed that the crowns of the third molars are not only stunted in their growth, but the structure of the enamel and dentine is of very poor quality, as compared with the other molars in the same mouth and on the same side. There seems to be a want of proper deposition of calcium salts, as well as a lack of proper crystallization and life-giving properties after they have been deposited. Large fissures and pits are noticed, not only in the sulci, but are very commonly found in other parts of tooth-substance where we would naturally expect to find strong, healthy tooth-structure. The crowns are much smaller, as compared with the other molars on the same side, and are always irregular in shape, sometimes long and sometimes short; frequently they will be serrated or scalloped, and occasionally they have the appearance of two teeth fused together. Harris* says of the third molar that it is "both shorter and smaller than the other molars, and that the roots of the upper are occasionally united, while the lower has usually but one root." Wedl: "The crowns of the wisdom-teeth, especially the upper ones, are most frequently stunted in their growth. Dwarfish growth affects these teeth most frequently and occurs by itself, often unaccompanied by any other deformity." Mr. John Tomes† says, "First molars will be found to be the most constant, and the third molars the least constant, in the number, shape, and position of their roots." Mr. Felix Weiss‡ says that "this tooth varies not only in shape, but also in size." Mr. Chas. S. Tomes§ remarks that among civilized races it is almost exceptional for the upper wisdom-tooth to be regular in form or position, so that extreme variability prevails among these teeth. It erupts at different periods, but in most cases it appears about the twentieth year.|| But in twenty-five per cent. of the cases it was found to be absent.¶ These statistics were computed from three hundred and twelve cases. Dr. Van Marter,** of Rome, made an examination of the skulls of the Umbrian and Etruscan races, which existed 500 B.C., with the same results.

The influences which are at work upon the teeth of the people of the present day act in the same manner as did environments, customs, and habits in those early days. I am of the opinion that the third molar is later in its eruption than in former years. In accordance with the eruption of the other molars, this tooth should make its appearance at about the eighteenth year. Occasionally this is found to be the case, but it is my experience that in a large majority of cases it does not erupt until after the twenty-fourth year, and frequently not until the twenty-sixth or thirtieth year. This can easily be accounted for, if the germ is present, from the fact that the jaw does not develop sufficiently to allow it to come through into place. This retarded condition is also due to the fact that at the points where all the other teeth are located, soft, spongy bone or alveolar process is found, and absorption of tissue takes place more readily at these points than at the point of eruption of the third molar, which is made up of true bone, which is dense and hard. Frequently, for want of room, it will erupt until it comes in contact with the second molar and then stop, in which case only a small part of the tooth will be presented. On the

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* "Dental Surgery."

† "Pathology of the Teeth."

‡ Proceedings of the Odontological Society of Great Britain, in *Brit. Jour. Dent. Sci.*, vol. xix, page 256.

§ "Dental Anatomy."

|| Wedl; Felix Weiss.

¶ Felix Weiss.

** *Independent Practitioner.*

upper jaw the crown of the third molar points toward the cheek. This is due to the fact that there is not room enough in the jaw when the tooth erupts. It slides out to the side, guided by the second molar. If there were plenty of room, both upper and lower third molars would erupt without pain, which is rarely ever the case. The pressure upon the jaw, second molars, and soft tissue frequently produces so much pain that the gums require frequent lancing, and occasionally it is necessary to remove the second molar. The roots of these teeth should be separate and distinct, like those of the first and second molars, but we rarely find this to be the case, as they are usually fused together ; and, while there is a separate canal for each root, the roots are virtually one.

I have examined and recorded observations upon 763 persons over twenty-six years of age. Of this number 342 were males and 421 were females ; forty-two per cent. of the males and thirty-eight per cent. of the females possessed no third molars. These questions naturally arise : Were these teeth in the jaw and not able to make their appearance, or were the follicles improperly formed, or were they missing altogether ? These questions are very difficult to answer, and can be decided only in the anatomical room. In this work it matters little whether the germs are present in the jaw or not. The fact that the teeth are not present in their proper places, and that when present they are in many cases crowded out of position for want of room, is proof positive that the jaw is not sufficiently developed to allow them to erupt normally. The fact that there is no space between the second molar and the angle of the jaw after the twenty-sixth year, as is found in the lower animals between the third molar and the angle of the jaw, is also proof that Nature has made no provision for the eruption of the third molar.

That the wisdom-tooth will eventually disappear among future generations, is maintained by many writers. Professor Wortman, in an article entitled "The Negro's Anthropological Position," published in the *Analostan Magazine* and abstracted in the DENTAL COSMOS, vol. xxxiii, p. 228, says, "In the white man the shortening of the face and consequent reduction of the facial skeleton has materially affected the dental arch. To such an extent is this true that it is almost the exception nowadays to find a perfectly well-formed arch with a normal set of teeth. The teeth that have been most affected by this change are the last molars, which may be truly said to be in an advanced stage of disappearance, and at no very distant period the European skull will be further characterized by the absence of the third molar. When it is developed it is always smaller than the other molars, the roots are connate or grown together, and it is so lacking in vitality as to be subject to rapid decay, frequently necessitating early removal." I quote from Brunton :* "In nearly all the black people the wisdom-teeth are generally furnished with three fangs and are sound, while among the whites they have only two fangs and decay early. Most ancient jaws exhumed in Europe present the former character." Richard Owen † says that the wisdom-tooth is sometimes not developed. Darwin :‡ "Formerly the wisdom-teeth of the upper jaw possessed not only three fangs, but also in some cases four, five, and six. Now, among the American races, in both the upper and the lower jaw the roots of the wisdom-teeth are fused together."

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* "Races and People." † "Odontography." ‡ "Descent of Man."

That the wisdom-tooth grows smaller as we ascend the scale of civilization is upheld by many writers. But even in the lower races, although the wisdom-tooth does not present the variations that are found in more civilized races, we find that it is far inferior to the teeth of the ape and chimpanzee, although among these animals we find the first indication of the step toward the degradation and subsequent disappearance of this tooth.*

But the tooth in all these cases is as serviceable as the other molars. Among some of the monkey tribes the third molar is of equal size to the first and second, while again in others it is larger and in some others is smaller.†

Mr. Darwin maintains that these teeth are rather larger than the other two molars in the orang and chimpanzee.‡

Mr. C. S. Tomes says, § "In Macaques the third molar is larger than the first two, and is quinquicuspid below; the upper quadricuspid. It is generally said that in man the molars decrease in size from before backward; that the first molar is largest, while in the anthropoid apes the contrary is the case. This is true on the whole, but requires some qualification, as in the Australian the second and third molars are not smaller than the first, and of the chimpanzee the same thing may be said to be true. In the anthropoid apes the wisdom-tooth is nearly or quite as large as the other molars, and shows no variability, while it comes into place almost simultaneously with the canine. In the higher apes, such as the gorilla, the third molar is in every respect a well-developed tooth, sometimes even larger than the first or second molar, but instead of a spongy, softened crown it has a crown on which the cusps are arranged according to the typical pattern." He also says || that "the wisdom-tooth (in lower races) has ample space to range with the other teeth, and is a characteristic molar. In the lower races of mankind the wisdom-tooth appears to vary but little, is of large size, and is never misplaced. In the more civilized races it is quite exceptional for the lower wisdom-tooth to have the four cusps distinctly developed. This is one of the things which pointed to its disappearance." Mr. Mummery says, "Among the stronger African tribes the third molar was always present in the lower jaw, but in the enfeebled races it was frequently absent." Professor Allen describes the third and fourth molars of an Australian skull, which show a tendency to the bicuspidate type.¶ But still more marked differences are found between the savage and civilized races than between the savage races and animals. In civilized man the degraded condition of this tooth in its degeneracy and imperfection is very great, as compared with the nearly perfect condition of the same organ in the lower primates.**

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*Thompson, "Care of the Wisdom-Tooth," etc.

† Professor Owen.

‡ "Descent of Man."

§ "Dental Anatomy."

|| Proceedings of the Odont. Society of Great Britain.

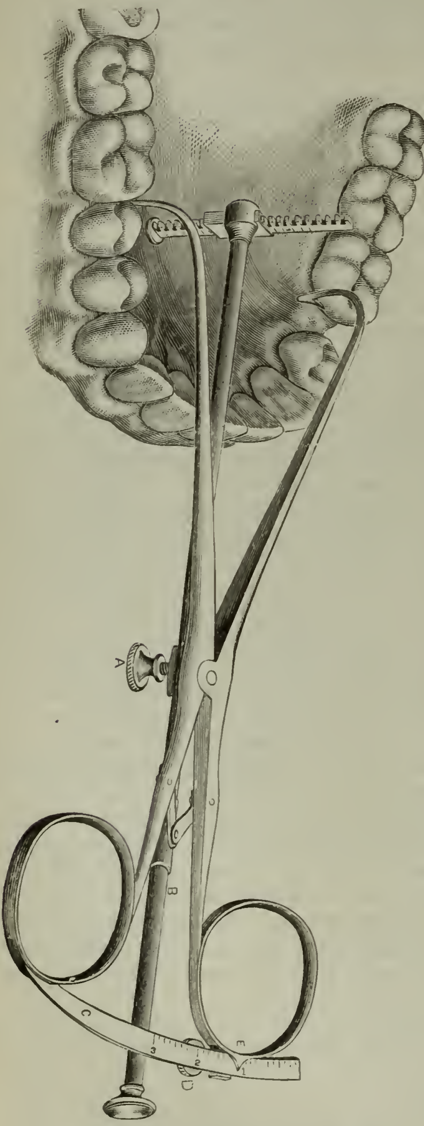
¶ DENTAL COSMOS.

**Thompson, "Care of the Wisdom-Tooth," etc.

HEIGHT OF VAULT.

The height of the vault in most cases is far below the average of the present day. In 4614 measurements* of normal individuals, made by the author, it was found that the average height of the arch was .58 of an inch; the measurement was made from the alveolar border between the second bicuspid and the first permanent molar to the height of the arch. Fig. 7 illustrates an instrument invented by me for the purpose of measuring these cases; it also shows the position of the instrument upon the model when the measurement is made. The theory advanced by me in a former paper was that the more intelligent the race of people in a section of the country, the higher the vault. That is to say, the more highly developed the brain, the more prominent the frontal and parietal bones and the higher the vault. The lower these bones are, when in a normal condition, the lower the vault is found. In most of the uncivilized races we find the jaw well developed, but the vault low; while, upon the other hand, the jaws of the intellectual people are narrow and the vault is high. I do not wish to be understood as saying that low vaults are never observed with high foreheads, or high vaults with low foreheads, because we do sometimes find this to be the case, although it is very rare.

FIG. 7.



On the other hand, the high vault is not always indicative of a developed brain, or a low vault of an ignorant individual. In a general way, if we enter a church and look up at the ceiling we know whether the roof is dome-like or flat; we judge whether the outside of the roof corresponds to the inside. So with the vault and outside or cranium,—if the vault is high, the cranium will be high, etc.

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* See article, "Mouth-Breathing not the Cause of Contracted Jaws and High Vaults," DENTAL COSMOS, November, 1891.

The shape of the vault, however, like the shape of the cranium, does not indicate the intelligence of the individual. Thus by glancing at the table we will observe that the ancient Peruvians and the Sandwich Islanders have the highest vaults, although one of the lowest vaults is also found in the mouth of an ancient Peruvian. I think I am safe in the assertion that the high vault indicates a neurotic condition inherited from the parents.

Having studied the measurements of the jaws of crania as well as of living individuals, and noticed the changes that are taking place, let us now study the causes that are producing these changes.

(To be continued.)

ADENOID GROWTHS, MOUTH-BREATHING, AND THUMB-SUCKING IN THEIR RELATION TO DEFORMITIES OF THE JAWS AND IRREGULAR TEETH.

BY NORMAN W. KINGSLEY, D.D.S., NEW YORK, N. Y.

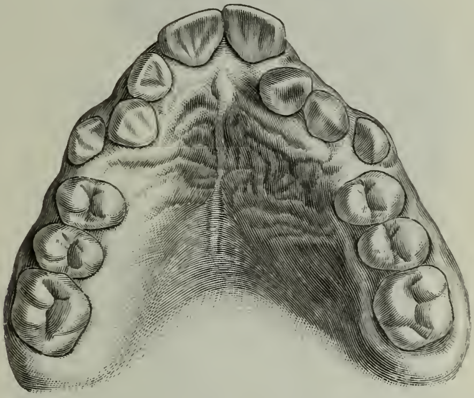
(Continued from page 107.)

MY next illustration of abnormal protruding jaws is that of a little miss, twelve years of age.

In this case the lower jaw was perfectly developed in every particular, the teeth were all good, stood excellently well in their relations to one another, and the alveolar arch was well shaped.

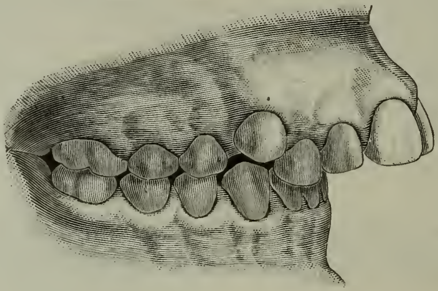
The width of the upper jaw was normal, and the articulation of the molars and bicuspids of both jaws, while not quite in accordance with a standard which is considered the perfect type, was nevertheless good. The surface of every masticating tooth had a good occluding antagonist. The form of the upper arch is shown in Fig. 18, and the articulation in Fig. 19. The face of the upper incisors, in advance of the lower ones, is here 19-32 of an inch.

FIG. 18.



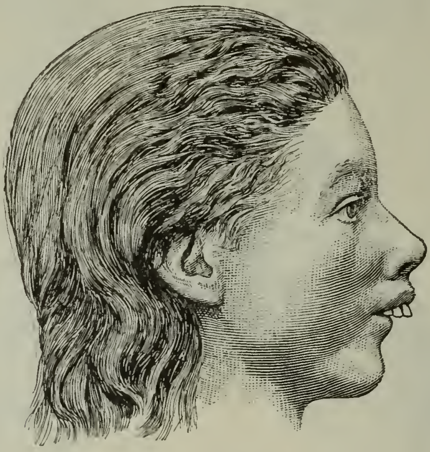
While the discrepancy in this case does not measure so much as in the last case described, the effect upon the external features was more disagreeable. The face in profile, as taken from life, is shown in Fig. 20, and it was said that she could not make her lips to meet. Perhaps this would not have been such a misfortune in a man, but in an otherwise pretty girl, approaching womanhood, her situation was deplorable.

FIG. 19.



The history of the case is principally made up of negations. There was no thumb-sucking, no catarrh, no adenoid growths, no enlarged tonsils, no mouth-breathing, no inordinately high vault. The teeth and jaws of the father are good; the upper jaw of the mother is prominent, but less so than that of the daughter. The daughter's jaw would not be more prominent than the mother's but for an extra pair of laterals. These extra lateral incisors are a point of extreme interest. They are not what are usually termed supernumerary teeth, since they were antedated by similar teeth in the temporary set. In plain language, this child had four equally well-formed lateral incisors in the first set, and again in the second.

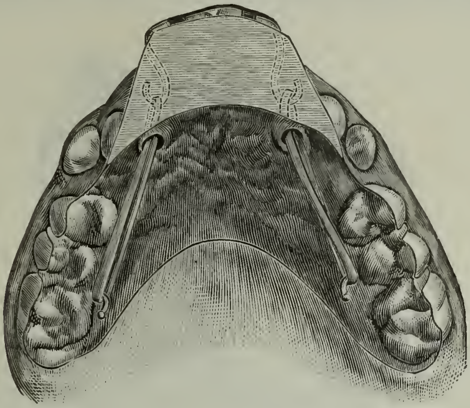
FIG. 20.



It was decided to remove the pair next the centrals. These, when extracted, showed well-formed and fully developed roots.

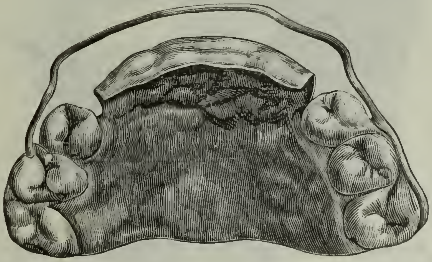
Owing to the pitch as well as projection of the incisors, the same difficulty confronted us as in the last-described case. If moved back without the cutting-edges being kept on the same plane, they would be likely to elongate enormously and give the child the appearance of a rodent. To meet this emergency the same plan was adopted as in the former case, although, as a matter of history, this antedated the other. The apparatus is shown in Fig. 21. It was made of 18-carat gold plate, No. 29, and the principle of its action was identical with that of the silver plate before described. This plate was secured by little gold catches, passing outside between the bicuspids and between the second bicuspids and the molars on each side, and entering a short distance between these teeth at the margin of the gum. With these catches attached, the plate had to be sprung into place. The traction was made with a band over the centrals, and elastics. The arrangement of the elastics was such as to throw outward the two remaining laterals, which were, until then, standing within the arch.

FIG. 21.



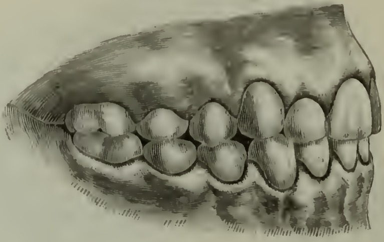
This apparatus was applied on the 10th of October, and by the middle of December following the reduction was nearly complete. The main attention at the office which this required was cutting off the flange as the teeth retreated, and changing the form of the band in front, as needed from time to time.

FIG. 22.



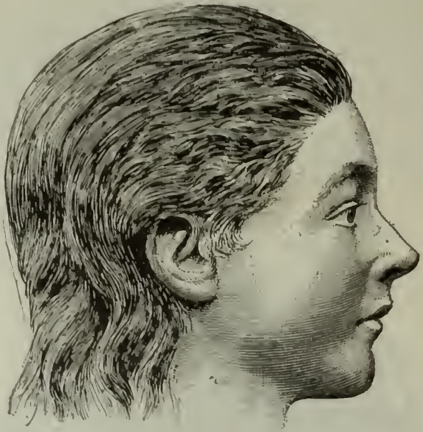
The patient, living in a distant city, desired to spend the holidays at home, and this apparatus was removed and substituted by a gold plate, fastened in the same way, but with a small wire passing around the incisors in front. The wire not only retained what had been accomplished, but served to even up the circle of the arch, and by a little bending, to reduce the front still more, until at the end of another month the circle was good and the teeth of the upper jaw close together. The reduction in this case, measured as before described, was twenty-three per cent.; the actual retreat of the incisors measured in inches was less than in the former case, but the percentage, owing to the smaller jaw and smaller teeth, was greater, and the effect upon the external features more pronounced. There was, however, still a discrepancy between the upper and lower jaws, but the fault now was with the lower one, which closed about one-third the diameter of a bicuspid too far back.

FIG. 23.



On February 1 a flange was built on this plate behind the incisors, to "jump the bite." This plate is shown in Fig. 22. In a few weeks the patient had acquired the habit of shutting the lower jaw in its new place, and the work was virtually complete, but the wearing of the plate was still continued until midsummer, more as a retainer than otherwise.

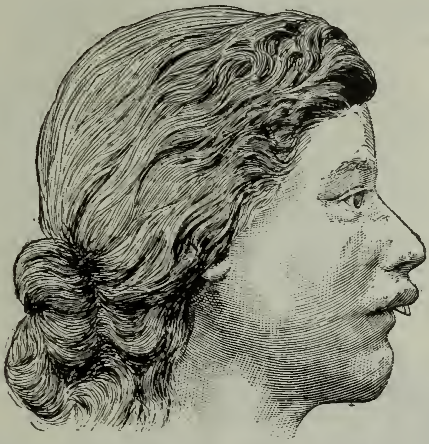
FIG. 24.



This apparatus was then discarded, and in its place a crib of light gold wire was substituted as a retainer. The result of the correction is shown in Fig. 23, representing the articulated models, and in Fig. 24, giving a profile of the face as the patient is at the present time. A comparison of this with Fig. 20 shows a striking contrast. The relation of the upper lip to the lower lip and chin has here reached the artist's ideal; the face is radically transformed, and the lips can fulfill their highest function.

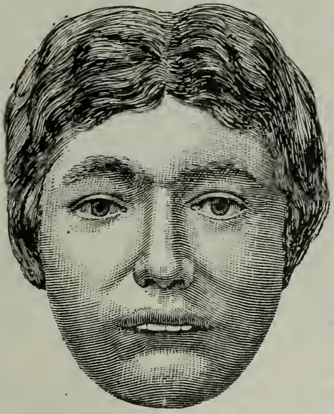
The last case which I shall present in this series is that of a young lady, eighteen years of age. The projection of the upper jaw produced an effect upon the expression of the face that was almost repulsive.

FIG. 25.



This is shown in two views of the face, Figs. 25 and 26, and in the articulated models, Fig. 27. The front of the upper incisors here is in advance of the lower incisors 18-32 of an inch, and while this discrepancy is nearly the same as in the last case, it is relatively less, because these jaws are large and the teeth are large. There is but little

FIG. 26.



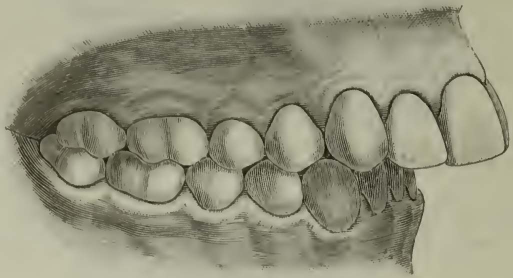
in this case other than the discrepancy, and its striking effect upon the external features.

The form of the upper arch, considered in the abstract, is good; this is shown in Fig. 28. It is neither wide nor excessively narrow. The teeth are even and the circle is good, the vault of the palate is neither high nor low, and, apart from other considerations, the whole jaw, alveolar arch, and teeth come very near a perfect type, and would be quite in harmony with some skulls.

The occlusion of the teeth is good; that is, every grinding-surface of the lower teeth has its antagonist upon the upper jaw, and for masticating purposes no apparatus could be better; nevertheless, the articulation is not normal, as the lower jaw closes one tooth behind the proper place.

Looking for causes, we find principally only negations. She did not inherit this peculiarity from father or mother; there were no enlarged tonsils; there was no impediment of the nasal passages, no thumb-sucking. She was, however, a mouth-breather, in sleeping, and to some extent at other times; but with the mouth closed there was free respiration through the nares, and when the correction of this deformity was completed, the mouth-breathing habit was broken up.

FIG. 27.

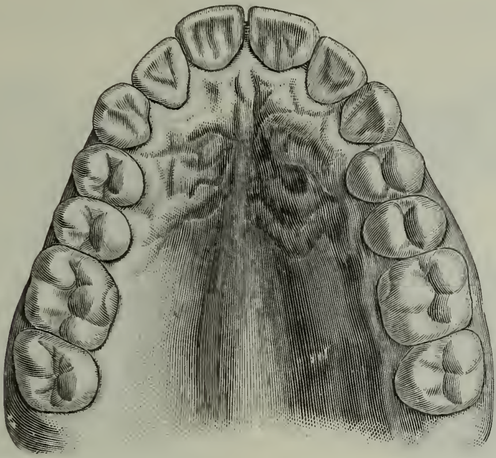


To correct this deformity, I believe that a majority of practitioners would have advised extracting a tooth from each side of the upper jaw, because it would be argued that the occlusion of the masticating teeth was so excellent that there was no justification for breaking it up, when the six front teeth could be carried back without disturbing the articulation.

I did not pursue this course because the pitch and inclination of the incisors was already good; to have removed teeth from the upper jaw and reduced the prominence until such space was closed, or until the relations of upper and lower incisors were more natural, would have pitched the cutting-edges of those teeth inwardly, to the point of disfigurement. The ideal to be attained in this case was to widen the jaw, flatten it in front, reducing it incidentally, jump the bite to a normal one, and, thus advancing the lower jaw and chin, restore the natural and inherited contour to the face.

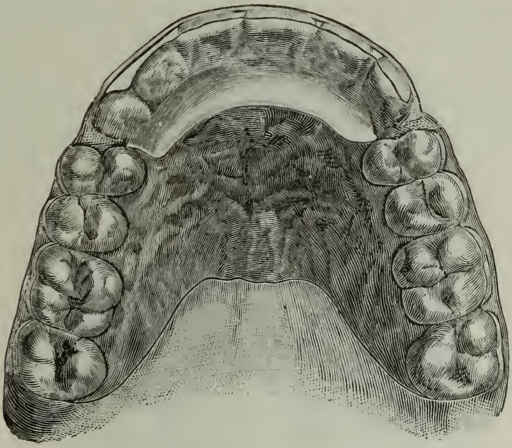
The first apparatus for correction was almost identical with that illustrated in Fig. 12 (page 103),—a vulcanite plate, jack-screw, and reducing band on the central incisors with rubber straps. This apparatus, with its renewals of elastics, was worn for a month, and the arch was widened across from the first bicuspids three-fourths the diameter of one of those teeth (or, expressed in percentage, measuring from the tip of the inner cusp of the first bicuspid across to the same eminence on the other side, the width was increased fourteen per cent.).

FIG. 28.



This plate was then substituted by one without the screw, but stiff enough to retain the width of the arch, and the pressure on the incisors was continued for two weeks longer, at the end of which time the arch was perceptibly flattened without apparently changing the pitch of the teeth. This flattening proved on measurement to be less than three per cent.

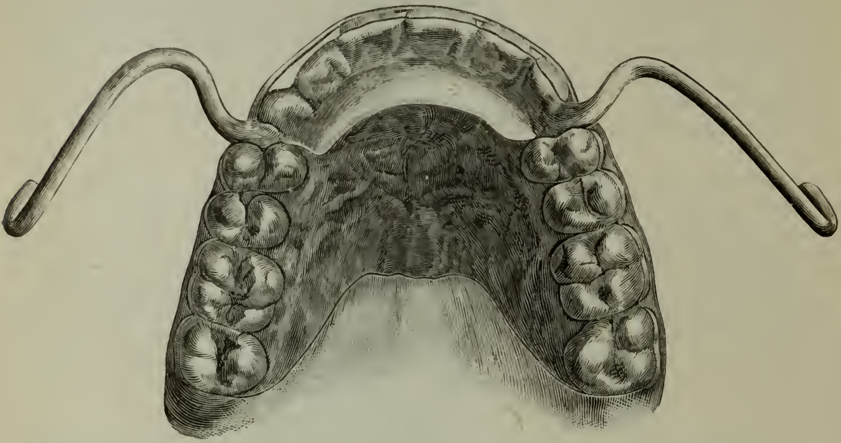
FIG. 29.



The apparatus for jumping the bite was made of silver plate, and was essentially the same as that shown in Fig. 22. It is here shown in Fig. 29, and was made to cover all the teeth posterior to the cuspids; it thus bound them immovably to that form of arch.

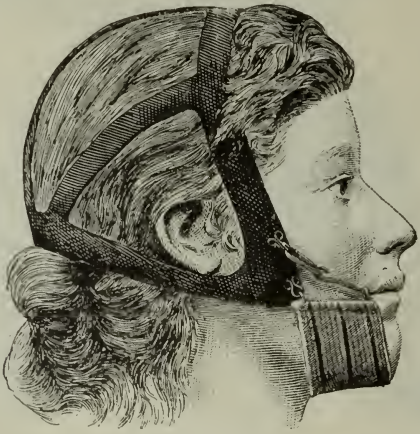
It was at this time approaching the summer, and the patient was desirous of spending a few months in the country, but I was not quite willing to trust to her own volition to change the bite, particularly as I discovered a tendency on her part to constantly drop the lower jaw.

FIG. 30.



Whether this habit arose from her former inability to bring the lips together, or whether it was a mouth-breathing habit arising from other causes, I cannot say ; however, it seemed sufficiently confirmed to need extraneous help to break it up, and I devised the apparatus illustrated in Figs. 30 and 31.

FIG. 31.



The appliance for the mouth, Fig. 30, was a copy of the silver plate already being worn, also made of silver, with the addition of arms attached to it projecting from the corners of the mouth and extending along the face a couple of inches toward the ears. A skeleton skull-cap was also made, and connected with the arms by an elastic strap, as seen in Fig. 31. This, as will be seen, was thus acting only upon the upper jaw, and was not originally intended to reduce that undue prominence, nevertheless it did prove of great value in that direction.

The primary object of this skull-cap and its connections with the plate in the mouth was to afford an attachment for an elastic band going under the chin, which should press with only sufficient force to overcome the natural inclination of the lower jaw to drop.

FIG. 32.

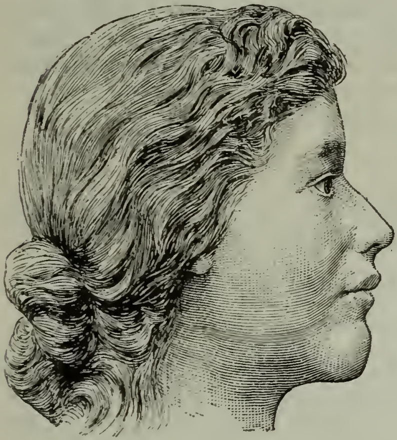
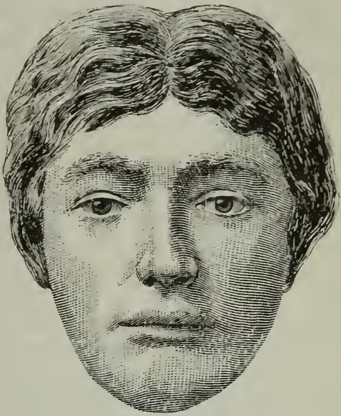


FIG. 33.

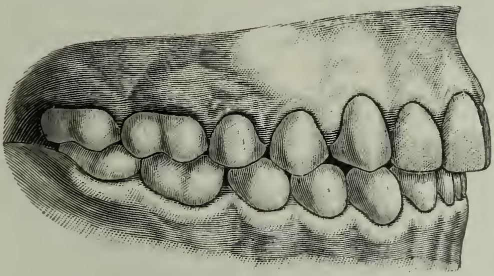


The patient had now two appliances for jumping the bite, and one or the other was worn constantly,—the skull-cap at night, and as much as convenience would permit during the day.

She was absent six months, and on her return the lower jaw seemed to have found a resting-place permanently in its new and normal location.

And the woman was transformed ; a face which six months before was almost repulsive had become handsome, and its expression winning. The relation of the upper to the lower lip in profile had very nearly, if not quite, reached the artistic ideal.

FIG. 34.



Two views of the transformed face are here given (Figs. 32 and 33).

I do not believe that the whole of this change was due to the advancement of the lower jaw. I believe it to have been a compromise effected partly by throwing the lower jaw forward, but the great apparent change in the upper lip must have come from some yielding of the entire upper arch in obedience to the strain from the skull-cap.

The final occlusion of the teeth is shown in the articulated models, Fig. 34.

It is marvelous how great the effect is in the expression of the lips, which is made by a change so slight that it can hardly be expressed in measurements.

In this case a very careful and exact measurement, using the nose and forehead as fixed features, shows that the upper lip, where it joins the nose, remains unchanged, but the same lip has been lengthened by this process one-sixteenth of an inch, and its outer border is two-sixteenths of an inch only less prominent than before.

(To be continued.)

THE CODE OF ETHICS IN ITS RELATION TO THE PRESENT NEEDS OF THE DENTAL PROFESSION.

BY RODRIGUES OTTOLENGUI, M.D.S., NEW YORK, N. Y.

(Read before the First District Dental Society of the State of New York, February 9, 1892.)

THE code of ethics, in its relation to the present needs of the dental profession, is a set of arbitrary rules, enacted by men whom we all respect, but who adopted them in the spirit of imitation. Being anxious to be considered medical men, they aped that profession in the formation of societies and in the adoption of written rules of conduct.

The dental code is a modified copy of the medical code; and the medical code is almost substantially a copy of a code of ethics prepared at the end of the last century by a Dr. Percival, of Manchester, England, and intended to serve as a guide for his son, who was about to begin the practice of medicine in a distant city, away from parental jurisdiction. That we, the practitioners of a century later, should feel that we are still in the position of the worthy Dr. Percival's son, is belittling to our professed dignity, and an unworthy admission that, having no father to guide our faltering steps, we needs must lean upon written rules lest we totter into the mire of ungentlemanliness.

Leaving dogmatism for awhile, let us consider whether or not there is a good purpose in the continuance of the code, and, if so, whether these written rules are observed, and whether the wished-for result is attained.

To descend to personalities for a brief moment, I will state that after practicing for fifteen years I dare to assert that I have never in any way broken a rule of the code, either in the letter or the spirit. Yet I never read the code of ethics until about a year ago, when I was named as one of a committee to revise the constitution and by-laws of one of our local societies. If these two statements be—and they are—true, then it follows that the code of ethics, as a written code, has had nothing whatever to do with controlling or forming my professional conduct. And I contend that this will always be the case. A professional man is a professional man, not because of forced obedience to special law, but by inherited instinct. Per contra, no amount of written law will convert a blackguard into a gentleman, nor make a charlatan a professional man. What it will do, however, and what it is doing all over this country, is, that by specifying a mode of punishment for slight wrongs, it enables the charlatan who cries so loudly that he is professional to grind down the poorer man who is his neighbor, and who is attempting to rise. It enables this ass who hides his true form in the skin of a lion to terrorize his brother-dentists, so that while they scrupulously follow the code, he is surreptitiously lining his own pockets. He builds up his practice by methods just without the pale of the code and its punishment, and to which his neighbor would not descend, code or no code. To be more explicit, I must enter the dread domain of advertising. That is the great bugaboo of the code men. Yet the code is so elastically drawn that it will exclude what might be considered legitimate and honorable advertisement, while it permits, or at least cannot punish, advertising which is far more profitable to the man, though unworthy the gentleman.

In my position as chairman of the executive committee of this society, my attention has been drawn by many men both in and out of the society, and in and out of the state, to certain so-called infringements of the code, with the expressed wish that I should give an official opinion upon them. For example, I have been asked whether or not it is not advertising for a man to write an essay, and then to circulate the reprints of the same. I have looked into this rather exhaustively, and I find that it is commonly done among physicians, whose code we are copying. It is done, too, with the distinct intent of advertising the ability of the author. True, the circulation is generally limited to medical men. But it must not be forgotten in this connection that the spirit of advertising is to increase patronage. In the medical world, we find that the field is so large that it is cut up into many separate departments called specialties. In each, the specialist restricts himself to his one line of practice. Thus, the gynecologist feels perfectly safe when he sends a patient to an oculist, because he knows, first, that the oculist will do nothing to prevent the return of the patient to himself for gynecological service ; and secondly, he knows that the favor will be reciprocated and that the oculist will some day send him a patient. Thus the distribution of reprints among physicians is not only advertising, but it is advertising in the most promising field. If the same reprint reaches the patient direct, it will not have as much effect as when it goes to another practitioner, who, becoming convinced by it, then advises his patient to seek the author for assistance in line with his specialty. But it is also permissible in certain directions for the physician to send his pamphlets direct to his patients. For example, I have seen innumerable dietetic lists headed with the name and address of the physician recommending them. This is a common and growing practice. A card of this kind is kept by the patient, and is not only passed to others, thus helping the physician by spreading his fame, but it is beneficial to society in circulating wholesome advice. Thus it would seem that the dentist could cite ample authority for the mailing of reprints either to his colleagues or to patients.

From the dentist's standpoint there is little advertisement in sending reprints to fellow-dentists, for it is a well-known fact that dentists do not send their patients to other dentists, at least not to men in their own city, except for free consultation. This brings us to a consideration of the distribution of the pamphlets among his own patients. I believe that under our present code a strict jury would decide that it is a breach to do this. Yet if so, then the code is plainly militating against one set of men to the advantage of another. If Dr. A can do a thing thoroughly well, and Dr. B can do it not only as well but also has the ability to write a lucid, comprehensive description of his work, he is a more useful man than Dr. A. Then if Dr. B does write a description of his work, and publishes it, does he not place his professional brethren under obligation to him, since he suggests to them, and enables them to do, a new and useful operation? Should those beneficiaries be able to appropriate his brains and labor to their own uses, and then, hiding behind the code of ethics, have the right to prevent Dr. B from reaping that reward from the public which he will never obtain from the dentist, except from those who like himself are constantly giving to the multitude, and receiving nothing in return? I hold that a man has the distinct right to manage and control his practice to his own best advantage. It must be remembered, in the first place, that to advertise among strangers is true advertising. To send reprints to one's own patients is totally different. These patients constitute the field of a man's practice, that he has already gained. If he has the brains to write a pamphlet, why should he not have the privilege of sending it to those who are already attached to him? Why should he not have the right to make these persons better aware of his ability, thus increasing their confidence in him, and at the same time rendering it more difficult for his unscrupulous neighbors to wean them away from him? For these neighbors, who so love the code, will not hesitate to advertise themselves with their tongues, since they cannot do it with their pens. The truth is, the reprint scheme is less condemned among physicians, because physicians as a class have more literary ability. More of them are able to be authors and partake of this method of advertising.

In setting up this line of argument recently, the question was asked, "Why could not these reprints, sent to patients, get into the hands of other men's patients?" My reply is, that where that happens, so much the better for the clever writer, and so much the worse for the other man. If he cannot keep his practice more attached to himself than this, he deserves to lose it, and the probability is that the patient will be benefited by the exchange. Besides, is not this exactly in line with legitimate methods of attracting patients? A woman, living in a boarding-house let us suppose, goes to a dentist, and has considerable work done. A number of conspicuous and beautiful gold fillings are inserted. She shows her teeth to other women in the house. They at once draw comparisons between their own work and that which is shown to them. If the difference is to their own disadvantage, they change their dentist. This man has advertised himself through his work, and through the confidence which he has inspired in his patient. Where, then, is the difference with the reprint? If the reprint convinces his patient that he is a skilled man, why should she not have the right to boast for him to her friends, and why should he not have the emoluments accruing therefrom? The field is not an exclusive one, except so far as the ability to enter is. It is not like paying for a newspaper advertisement, for that is open to anyone who has a pocket-book. The other is advertising, if you please, but it is advertising that is but the just desert of the man who has spent his nights in study, and thus after long waiting gains prestige and patients, while his neighbor has been increasing his own practice by systematically working his church, his club, the tradespeople with whom he will only trade on a plan of reciprocity, and his friends whose confidence he gains over numerous bottles of wine.

The code of ethics, then, strictly construed, would term the distribution of reprints as objectionable advertising, and therefore contrary to professional spirit. Thus the student is tyrannized over, and remains a true professional man, but a poor one. Why? Because he devotes his nights to study.

How does the code control the other man, who sells his text-books after procuring his degree? I will give you a sketch of such a person. As soon as he gets his office started, he goes to live in a large boarding-house. He works the whole house into his ledger accounts, and then he moves to another boarding-house. Has he broken any specific rule of the code? Not yet,—or at least you could not convict him of it. Soon he joins the church, and perhaps the choir; he becomes an active member of the Young People's Society. He fills the preacher's teeth and sends him a receipted bill, and in exchange the preacher tells everybody in the church. Is there anything in the code against joining a church and doing gratis work for the clergy? I think not. He starts several entertainments for the benefit of the church debt. It is mainly through his energy that they are successful. He also heads as many subscriptions as possible. In fact, he makes himself popular in that church. Meanwhile he joins a man's club. Here he spends his off nights. He becomes an adept at billiards, and he plays a good game of ninepins. He wins a few tournaments, and stands treat for the crowd. He gets upon the executive committee, and his great executive ability shows him the way to get most of the club men into his office.

Then he joins the Masons. He associates himself with different lodges and orders. Then perhaps he prints his card, or a few of them, for special circulation, something like the one which I will pass around. Observe that there is a conspicuous Masonic symbol in one corner, while we are told to what lodges he belongs. This of course is a bid for patronage through Masonic fraternity. I have erased the name of the dentist from this card. I did that because, however I may object to the code, I wish to be a professional man myself. To return to our ethical dentist. One day one of the elders of his church comes in and shows him a reprint bearing the name of a man who he knows is a skillful and reputable dentist. The pamphlet, too, is one of merit; the writer describes therein a useful operation original with himself, and beyond the ability of our friend, who has done no studying since he left college. What does he do? His commercial instinct comes to the front, of course. He at once denounces the writer of the pamphlet as a charlatan. He says to his patient, "Why, my dear sir, the thing shows on its face that the man is a quack. Don't you see it is an advertising dodge? Don't you know that no reputable professional man would stoop to this sort of thing?" He has the confidence of his hearer, and of course wins him over. But has he behaved in a truly professional spirit? Yet where does the code come in, in this? It does, to this effect. A charge is made against the offending author, and he is either publicly punished by his society, or else his accuser, fearing to make so open a stand, goes about among others of his kind ; they band together, and systematically do all they can to injure the man whose work has benefited them all, but who has dared to try to advertise his own ability, which he has earned by such hard labor.

In dismissing this phase of the subject, I wish to be personal once more. I have written much, as you all know. I have had but three of my articles in the form of reprints. One of these would not have been intelligible to any but the dental world, and was sent exclusively to dentists. The second was distributed in a similar manner, and the third is still in my office, though I intend to send it to physicians. I had these reprints made with the specific purpose of advertising myself among physicians in connection with a specialty, and do not hesitate to make the statement. I have never as yet mailed reprints either to patients or others, but I should certainly do so if I thought that it would be any advantage to me. If this be a breach of the code, perhaps I am fortunate, since I cannot be punished until I commit the act.

Of course I am well aware that it will be said by some that the two pictures which I have drawn are exaggerations, more especially the latter ; yet I am positive that there are hundreds of men who pursue precisely those methods of practice, and who yet obtain conspicuous positions in the community and in the dental world. Of course the community, being commercial in its instincts, sees no wrong in it, while the transactions are so cleverly managed that the dental world never can put finger upon the misdemeanors.

I know a man who personally told me that this reprint business is in his opinion contrary to the code of ethics, and reprehensible ; yet he does not hesitate to write personal letters on society paper, on which his own name is printed as one of the officers. Thus we kill the cat to make our fiddles sing.

To come, then, to my idea of a code, it is this : The present code is utterly useless. First, because it does not describe specifically all that which should be against the spirit of the rules ; secondly, we have various forms of the code adopted by different societies ; and third, it is practically a dead letter in that it permits sins in one direction, which are as bad, or worse, than those designated for punishment.

Claiming for myself that I am thoroughly a professional man, I have not the slightest objection to a code of ethics, if one can be devised that will be operative, and so coercive that the little fish shall not be fried for the pleasure of the big. I would suggest that a committee be appointed by the American Dental Association to co-operate with one from the Southern, and that these two shall decide first whether or not a code benefits the profession. If so, then let them formulate one which will fit the present status of dentistry better than this relic of bygone days.

In the first place, let them designate in no uncertain terms what is, and what is not, obnoxious advertising. Let them say that a man shall not advertise in the public prints, paying for the same. That he shall not invite a friendly reporter to describe his office and himself in glowing terms. That he shall not, because he has a corner house, make that an excuse to have a sign on both streets. That he shall not object to his neighbor's handbills, while he himself has a handsome door-plate so large that a person can read it half a block away. This sort of thing is inconsistent. Let them, in fact, say exactly how large the sign may be, and what may be placed upon it. Let them tell what we may or may not put upon our cards. Let them say whether or not we may move twice a year and send a notice to every patient, under the flimsy excuse of removal. Whether or not we may have two offices, and alternate between them, using the removal notice as a device for keeping our practice together. Let them tell us if we may put half a dozen degrees after our names every time we sign them. Let them say whether or not we may give free lectures on dental topics in public schools or in churches. Let us know if we may be interviewed by reporters, and if so under what circumstances. Let us know if we may write upon dental subjects for the education of the masses, and whether we may sign such articles or not. Let us have a distinct solution of the reprint question. Let us know whether or not we may show one patient the models of work done for another, and if we may admit in public or in private that we are dentists. In short, let us know if we are to have any liberty at all, and if so exactly how much. Let us know the length of the chain which binds us, so that we may all be bound alike. Thus let us escape the thralldom which now shackles one man hand and foot, while the next, through chicanery, may have the freedom of the city.

Then let the committee get down to a consideration of fraternal courtesy. Let us know how much we may criticise the work of other dentists ; how much we may say against their personal and private character ; whether or not we can do this sort of reviling among dentists, so long as we do not repeat these scandals to patients. Let us know just how much courtesy we owe to each other ; also how little we may display and pay the debt. Whether it is proper to allow our names to go down on society programs and then not appear. Whether we can borrow money on the plea of brotherhood, and return it or not as is best suited to our convenience. Especially let us know whether it is good ethics to print a calumny against another dentist, and then mail it to all his local associates. Let us know how far we may go in personalities in our journalistic writings.

But I need not continue in this line. If the committee of revision is ever appointed, and it cannot find flaws in the present code, then let it communicate with me, and I will agree to show one hundred loopholes, small in size to be sure, but large enough for the escape of the black sheep while the white remain to be shorn.

These specifications of the requisites of a code, of course, are exaggerated exactions. I know it. But if we must admit that we need rules for the guidance of our conduct, then in our pusillanimity let us confess honestly that we do not know how to act with courtesy, integrity, professional justice, and fraternal feeling, and that in this predicament we need some wise father to write out for us, in the most minute detail, how we are to guide our lives.

We claim that our societies are scientific bodies in search of knowledge, and then we throw up a barrier not of attainment, but of conduct, as though a blackguard may not be a great scientist, or as though every gentleman were a necessarily wise man. Of course I would not argue for the admission of the rascally, or the ungentlemanly, but I only wish to point out that we have erected an erroneous standard of membership. It is one that is not in use among scientists in other branches of knowledge. Then why on earth do we need it? Are we so much less civilized?

To show that I am not alone in my derision of the code of ethics, I will quote from a few eminent men of the medical world who have written on this subject.

Dr. Alfred C. Post, president of the faculty of medicine, New York University, speaking upon the operations of the medical code, says,—

"If such are the principles upon which medical men are to be governed, we can no longer be considered as members of a liberal profession, but as constituting a narrow-minded and intolerant sect, regardless of the interests of humanity, and of the opinions of intelligent and cultivated men in other professions."

Dr. William S. Ely, physician to the Rochester City Hospital, writes:

"If asked whether I would do away with the code, I would answer yes. We must trust to the unwritten code of gentlemen, or to voluntary organizations, to uphold the moral tone of the profession. I believe these measures to be better than a set of arbitrary rules, which suggest that the body of the profession cannot be trusted without them. . . . Though we have had the code for sixty years, there has been no uniform conduct established thereby."

The same gentleman in another place says, "When I ask my professional brethren to show me a man whom they would not trust without a code, they point to one whom they are forced to admit they would not trust with a code."

Dr. S. Oakley Vanderpoel, M.D., LL.D., emeritus professor in Albany Medical College, writes,—

"The necessity for a code of ethics implies, first, that the social status of the profession is such that an effort must be made to formulate in language what constitutes a 'gentleman.' This is an effort that no other liberally-educated or scientific body has made. Such a status, if not acquired by antecedents or education, can no more be formulated in language and applied to the novice, than can wealth and all its accessories applied to the ignoramus supply that which must be inherent or be imbibed in the first teachings of parental tenderness. Secondly, the necessity for a code implies that independence of thought and action cannot be tolerated; that no individual member of the profession, no matter what may be the peculiar circumstances under which he may be placed, shall exercise the right to act as his judgment dictates; but he must sink his individuality and submit to the impersonal dictates of a trades union which absorbs both the personality and the conscience."

He then states that of course the object of the code is to raise the standards and improve the condition and position of the profession. He asks whether the code has accomplished this. He admits that the profession has made tremendous strides, and then points out that every avenue to knowledge is being crowded with such earnest seekers after scientific truths that medicine has by no means passed other sciences, if indeed it has kept pace. He then says, "If this condition of progress is taking place not only in countries where codes of medical ethics are unknown, but even here where its workings have been undisputed for years, why shall the profession belittle itself by formulas of deportment, when there is a broader unwritten, instructive, self-convicting expression, 'conduct unbecoming a gentleman'? To this comprehensive expression all formulas of the code may be brought. This is the only code which any other of the liberal professions demands.'' In conclusion of his most excellent thesis he uses the following forcible language: ''There can be but one remedy in future action upon the subject of medical ethics; it is as futile to stifle discussion as it is to stop the force of a swelling current. The formulated codes will be abolished. This is as certain as that freedom of thought and action are the palladium of our institutions.''

Dr. Lewis S. Pilcher, a prominent physician of Brooklyn, gets to the truth of the matter quickly. He says,—

''A parent may formulate a set of rules to which he may require the child to conform his outward conduct as long as the child is dependent upon him for support. An employer may establish similar rules, conformity to which he may require as a condition of remaining in his employ. In both cases such conformity is a mark of dependence, a badge of servitude, and endured only under stress of necessity. A freeman rejoices in the right to regulate his own conduct, his manners, and morals, subject only to those limitations which the equal rights of other creatures impose upon him. . . . Of all classes of men, physicians are certainly the least in the condition of children that need paternal watchguard and rules of conduct; yet the singular spectacle is witnessed of a large proportion of physicians insisting upon the necessity for such provisions, either for their own guidance or as a standard by which they may try the conduct of others. To one who has a high notion of the dignity of manhood, as well as the deference due to his professional position, such a spectacle is a pitiable one, that might well excite his antipathy to the agents who made it possible.''

Speaking of the working of the code, he says,—

''It tends to make every man a spy upon his neighbor, and has made persecutions of the most petty nature possible. It has placed in the hands of certain men a weapon to use against those that are weaker. It has created a multitude of star-chambers all over the land, in which men have assumed to sit in judgment upon and to exercise discipline over their peers as to motives and methods of professional conduct.''

As this paper is already longer than I intended, I shall make no more quotations, though I have at hand most powerful arguments against the medical code, or anything of a similar nature, written by such well-known men as Dr. St. John Roosa, Dr. C. R. Agnew, Dr. A. Jacobi, Dr. H. R. Hopkins, and others of equal note. I have sufficiently shown that the medical world, whom we so affectionately copy, are by no means unanimous on this subject of ethics.

In conclusion, I have only to say that whether there be a continuance of the present formula which we term a code, whether there shall be a new one of more stringent doctrine to replace it, or whether the whole singular document shall be abandoned, I claim that a truly professional man maintains himself as such at all times, by conducting himself according to the standards of his own conscience. But as a last word I reiterate that if we are such barbarians that we must have written rules to obey, in a sense of justice let us produce a code which will operate more specifically and punish all alike.

THE ETHNOLOGY OF THE FACE.

BY ALTON H. THOMPSON, D.D.S., TOPEKA, KANSAS.

(Concluded from page 290.)

The Nose.—The nose is the imperial feature. It predominates over the other elements of the face, not only by its prominence and consequent conspicuousness, but by reason of its being the main symbol of character. Its ethnical variations are very great. Some of the peculiarities we are able to identify, and others, that we cannot yet diagnose, are equally indicative of racial descent when the data will enable us to read them aright. The variations in the different characteristics of size and form of the nose and of its different parts are quite extensive, and have an important meaning when viewed from the ethnical standpoint. A few that we can now read will illustrate this ; thus, the Australoid nose is noted for its very depressed root, which, when associated with a full and prominent glabella, makes a very striking characteristic. This is typical of the Australoid races, and can safely be defined as belonging to and descended from that primal type. It is found scattered through the European races and their descendants, sometimes associated with the full glabella and sometimes not. The Slav races have the depressed root, but with the flat and smooth glabella and brow-ridges that betoken Mongoloid mixture. The broad, thick end of the nose of the Australoid races is also noticeable, and is filtered through the other races, but as the Negroid races also have that form we cannot say that it is strictly Australoid. The absence of the nasal spines and the presence of the grooves, like the lower primates, is only an indication of the low type of races. The Mongoloid race nose is small, with flat bridge, small, pointed extremity and upturned. It is very characteristic, and is found not only throughout the entire range of the Mongoloid races, but has penetrated through the races of Northern Europe, especially in Russia, where the Mongol race has left its impress and its blood. The Mongol nose is essentially Simian in type. It is the undeveloped nose of the apes. Among the Melanochroid races of Europe a distinct type of nose has been developed, and is especially marked in the dark Celts. It is high, sharp, with arched bridge, and with long, sharp point, and is characteristic of those races. It might be called the Celtic nose, and is found everywhere among their descendants.

The Semitic nose is well known. The wide, prominent bridge, the spreading, curved nostrils, and depressed, almost hooked, end mark the Jew wherever found. The Arab nose is also distinct, with its narrow bridge, sunken root, small nostrils, and the sharp ends separated from the wings and hooked down. It is found filtered through the Moors and their descendants in Spain and the Spanish Americas, and often reappears in its purity.

The Xanthochroid races usually have a long, straight nose, sometimes high or again low. In the ancient Greeks the root is full and high, the line of the nose being straight with the forehead, which is often seen in the ancient sculptures. Many minor types of noses are observed as typical of sub-races, some of which could be identified with very little accurate observation. The nose is prone to the formation of composites, and perhaps the most of the descendants of the mixed races have such composite noses; yet pure, characteristic types often appear, which only require to be diagnosed carefully to be properly classified.

The Cheek-Bones.—The prominence, width, and height of the cheek-bones bear a more or less direct relation to the scale of development of a race. Most primitive and low races have full and high cheek-bones, and the upward progress of a race seems to result in reducing this feature, like prognathism. In a general way the Australoid races have high cheek-bones, the Mongoloid wide and full, and the European low and narrow. The wide Mongoloid cheeks are filtered through Europe and appear in the Slav, German, etc., and usually accompany the stub Mongol nose, but again appear with the high Celtic nose. The American Indian has high cheek bones, but with a high, sharp nose which is not Mongoloid. Some Negro tribes have high, narrow cheeks, accompanying decided prognathism, which is an indication of degradation, so that the real significance of this feature is obscure and confused.

The Mouth.—The study of this feature is of paramount importance to us as dentists, and a good classification of its many varieties is much to be desired, so that we may be enabled to recognize the different varieties as they are presented to us. To this end the ethnical classification is the best, and will aid us in mastering the peculiarities of its many forms and contours. The passing expressions of the mouth are not to be included in this category, as they are transient, although some of them may have an ethnical significance and may have been the origin of permanent modifications of the features. But here again we are met by the discouraging fact of the insufficiency of data from which to construct a classification of the many forms of the mouth and lips presented, with a view to their ethnic analysis. This feature is probably not subject to the influence of the mixture of races, and is not as disposed to form composites as many of the other features. It is usually of pure typal form, and may or may not be in harmony with the other features as regards their ethnic type. As the descendants of the European races are greatly mixed, the face is rarely pure and harmonious, but is usually a heterogeneous compound. So it happens that the mouth is rarely in harmony with the rest of the features; but when it is, when harmony of a pure type prevails, the result is real beauty or at least a pleasant satisfaction to the eye. But as a rule all ordinary faces are ordinary or worse, because of the deficiency and inharmony of one or more of the features. The inharmonious feature is often the mouth, and hence the fallacy, as is often recommended, of studying all the features together in order to secure the most harmonious arrangement of artificial teeth. If dealing with pure types, this might be good philosophy and perfect art, but in mixed peoples it is misleading and will result in incongruities. The only guide is the mouth, with the teeth, by themselves. The mouth, being usually pure in type, is its own best guide. It is rarely a composite, and so its peculiarities have a distinct value.

As regards its ethnical varieties, we notice first that among low races the mouth is wide, with thick, shapeless lips and drooping corners. As we ascend in the scale of advancement we find it contracting in width, the corners more upturned and sunken, the edges of the lips assuming a sharp, graceful curve, and the fullness much reduced and contracted to the middle third of its length. The straight, shapeless lips, with drooping ends, usually wear that plaintive, sad expression so characteristic of wretched peoples, who are miserable either from their weary struggle with nature, or from the oppression and injustice of higher races. A life of weary suffering leaves its mark on the lips first in a race as well as in the individual. The wide mouth with thick lips is found through the higher races of Europe, and is inherited from the Australoid and Mongoloid races, as it comes from these primal types.

There are many peculiarities of the mouth which are characteristic of minor races, and which would be very interesting if they could be read aright. The mouth of the Latin races, especially the Spanish, is clear-cut, the margin arched like "Cupid's bow," being full in the center and depressed at the corners. It is usually accompanied by the small arched Latin jaw, the combination forming a beautiful type. Then there is the mouth with the upper lip fuller than the lower and overhanging it, or the protruding lower lip. These types are often seen in Europeans, and are sometimes handed down in families. There are other peculiarities which are marked and conspicuous, and which must be ethnical, could their lineage be traced. This branch of our subject will be of especial attractiveness to pursue, on account of our professional interest in the mouth.

The Chin.—The chin presents some variations that are of considerable interest. Being an essentially human feature, the apes not possessing it at all, it is in many respects unique. In lower races it is not well developed, and bears an inverse relation to the extent of prognathism. When prognathism is pronounced the chin is reduced, and when the former is reduced the latter is well developed. Thus in the orthognathous European races we find the chin well developed, and its fullness gives the profile its perpendicular contour. The chin is usually strong in the intellectual races and small in the weak races, serving, indeed, as an index to the mind and character.

The chin has some ethnic peculiarities which have not been worked out, as to whether it is square, round, or pointed, high or low at the apex, dimples or other marks, etc., which would be interesting to follow out to their ethnic origins.

The Ears.—Observations on the ears were not taken in this study at this time, but the ear has many variations which, like the variations of the other features, have a distinct ethnic value.

In conclusion, we hope that we have shown what interest the subject of the origin of the face presents, and that it affords a rational hypothesis of the origin of the facial variations in different races. We contend that these variations of the features are not accidental, but are inherited, and that each one has an ethnic history. It only remains to accumulate reliable data to enable us to read their history aright and trace the descent of every variation back to its ethnic origin. This will give us a rational physiognomy.

METHODS OF FILLING TEETH.*

BY RODRIGUES OTTOLENGUI, M.D.S., NEW YORK, N. Y.

(Continued from page 280.)

METHODS OF PRODUCING CONTOUR FILLINGS.

Gold.—When attendant circumstances do not contraindicate its use, gold undoubtedly will give the greatest satisfaction where any considerable portion of a tooth must be reproduced. I have known men who have claimed that they could make a permanent contour with *non*-cohesive gold. I do not doubt that such men do what they claim, but these individuals are very rare. Therefore I advise the beginner to depend upon *cohesive* gold when his filling must extend beyond cavity-borders. Moreover, I would suggest that he obtain gold *as cohesive as it can be made.*

There are certain methods of manipulating gold, essential when contour is to be reproduced, which may not be so in ordinary cavities. For example, I have said that a filling might be made hollow, provided it touched the walls at all points. This would be a grand error in a contour filling. It has been stated by some that a large cavity may be well filled with crystal gold, the lower portion being only partly condensed, provided the upper third be made solid. However this may be in ordinary work, it is not to be thought of in contouring. The rule must be that in placing a contour filling, every piece of gold, from the very first to the very last pellet, must be thoroughly condensed, and each and every pellet should display perfect cohesion. To take up these two points separately for a moment : Let us suppose an ordinary cavity with surrounding walls ; it is half filled ; the operator places a pellet, and mallets it less thoroughly than he has done its predecessors. He adds another, and continues the malleting. Of course the force of the blows will further condense the under pellet. Even if it be not completely condensed, the fact that the shape of the remainder of the cavity is retentive without regard to that part already filled, makes it a matter of no moment whether that one pellet is, or is not, thoroughly packed. With a contour filling it would be a most hazardous oversight to leave even a single pellet of gold insufficiently condensed. That point would be a weak spot. However solid the rest of the filling may be made, the time may come when, under strong pressure in mastication, a fracture of the filling will occur just where that pellet was placed. If heavy foil is being used, the rule is even more imperative. Every layer must be thoroughly condensed before the next is added, for the reason that, with this kind of gold more than any other, an underlying layer is less likely to be condensed where another is superimposed before the malleting is completed. For a similar reason, no matter how much need there may be to hurry, the dentist should never pick up two or three pieces of heavy foil at one time and attempt to condense them in that form ; the ends, being irregularly arranged, will fold one over the other in such shapes as to offer the greatest possible resistance to the mallet, the result being improper condensation.

With the other point, relative to cohesion, the necessities for extreme

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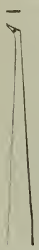
*Copyright, 1891, by Rodrigues Ottolengui.

caution, extending to every pellet, become evident along the same lines of argument. It is as bad for a filling to fracture because one layer did not cohere, as because there was a flaw from lack of solidity. As before, non-cohesion, or slight cohesion, may be overlooked in the body of a cavity having surrounding walls, because what is placed above it will still be retained by the upper part of the cavity. It is otherwise with the contour filling. If only one layer, especially if it be of heavy foil, fails to cohere, all that which follows is but added to, and is not a part of, the filling. A fracture may be expected at any time.

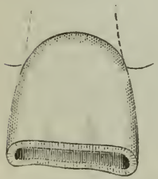
It therefore follows that the size of the pellets, or strips of heavy foil, should not be increased near the end of the filling in order to hurry the work. Larger pellets or pieces will render solidity and cohesion both less liable. Above all things, large or even moderate-sized foot-pluggers are to be avoided, though more permissible with the Bonwill mechanical or the electric mallet than where a hand-mallet or hand-pressure is relied upon. I wish to condemn the foot-plugger for this class of work, yet must speak with caution. Many men of skill use the foot-plugger with success, and with more rapidity than where another form was chosen. But these men select a foot-plugger which is narrow, and reaches a sharp point at one end. Thus in one instrument is had the action of a foot-plugger, or of a point. Such a plugger is shown in Fig. 84, and is most useful. What I am advising against is a broad, flat, and unusually long foot-plugger. This condenses so much surface at once that thorough cohesion is doubtfully, if ever, obtained.

Fig. 84.



One more essential point: In packing any filling I make it my rule that, from the very initial pieces, the shape of the cavity must be such that I can use the mallet, without needing another tool to hold the gold steady. This is the rule; exceptions exist, but are very rare. *Applied to contour fillings, the rule must have absolutely no exceptions.* Every piece of gold as it is added, must produce a filling, as far as the work has progressed, to dislodge which would require the engine drill. How this may be attained in specified cases, and in cavities offering special difficulty, will be discussed later. I merely call attention here to the fact that, in contouring, this rule must hold complete sway. If at any time it is found that the filling will tip, or move in the slightest, the operator may as well remove his gold and reshape his cavity. To emphasize this point, I will relate a case which occurred early in my career.

Fig. 85.



I was asked by a dentist, whose experience and skill were much respected by myself, to be at his office one afternoon to assist him in placing a large contour filling. He wished me to mallet and pass the gold. I did so. The tooth was a central incisor, and the cavity as he prepared it is shown in Fig. 85. It is seen that the cutting-edge is absent. The operator had prepared a cavity retentive in shape, merely because with a wheel-bur he had made an undercut, or groove, all around. This is exactly the plan to be followed in similar cases, where from abrasion the ends of teeth have been worn away, and it is desired to stop the destruction by offering masticating surfaces of gold. Then the filling is made *flush with the top of the tooth*, and will remain in place even though it must be held with another instrument all through the process of packing. (This, of course, need not be if the groove be properly shaped to retain the first pellet.) To so arrange a cavity, however, where, as in the case which I am citing, *about one-quarter of the length of the tooth was to be restored*, was absurd. Thus I thought, but of course made no comment. The dentist began with a rather large pellet, and proceeded much as though he had been using *non*-cohesive gold. That is, he was mainly depending upon wedging the pieces across from one groove to the other, using one instrument for condensing under the force of the mallet wielded by myself, and another to prevent the gold from rocking or moving. This was kept up till the whole cavity was filled flush, when of course it *appeared* solid. Then the work progressed rapidly, till the whole contour was completed, at the end of two hours' work. *In finishing this filling with a file, the dentist succeeded in straining it from its anchorage so that it could be slightly rocked.* He looked at me silently, and I refrained from speaking. He tipped it out, and, strange to say, proceeded to refill the cavity without change of plan. This time he succeeded in making the contour, and also in polishing it so that it *looked* really handsome. Moreover, it lasted as long as the lady lived, though I should record that *she died two weeks later*.

The essential features of a gold contour, therefore, are extreme solidity, extreme cohesion, and extreme immobility throughout and at every stage of the operation.

Amalgam.—It is frequently admitted that amalgam has been a much-abused material. This charge against dentists is more true in relation to contour fillings than in any other connection. It will not suffice to say that, for contouring, amalgam is a *valuable* agent. It is necessary to say that it is *invaluable*. Its usefulness is inestimable. It may be made to save teeth which without it would be lost, or, at least, even if saved, would be of but slight service for mastication.

In the realm of contour work, amalgam occupies a place that is unique. With it can be restored all those forlorn cases, those wrecks, which half a century ago were inevitably consigned to the forceps. Yet, with shame it must be admitted that only a very few men know how to obtain the most desirable results with amalgam in these very cases. The man who can restore a molar where caries has advanced beneath the gum, two or three cusps being entirely absent, and build upon this unpromising foundation a tooth which becomes as useful as the original, and which, moreover, remains permanently in place without fretting the gum and without inviting decay along its borders, has more right to count himself skilled than the best gold-filler that we have known.

In small cavities the plastic is the more manageable material, but as the size of a cavity increases, manipulation with gold becomes *less* difficult, the added obstacle being only the tediousness of a lengthy sitting. With amalgam it is otherwise, for the larger the cavity the *more* difficult it becomes to attain the highest success.

Amalgam, then, in contour work may well attract our special attention. I must point out the obstacles to its proper use, and tell how to combat them. How often have we all expended a half-hour or more restoring a lost corner of a molar, only to have it return on the following day, with a portion of it missing? We say to the patient, "You must have bitten something on that before it was thoroughly hardened," but that is no satisfaction either to patient or dentist. The work remains to be done over, and discussion does not mend matters, especially as the same risk must be taken again.

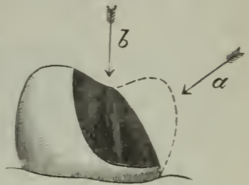
This tendency to fracture, in an amalgam filling, is due to several things. Of course, if the occlusion be sharp, the explanation given by the dentist may be true; mastication may have dislodged a portion of the mass. But where such an accident is possible, the dentist must note the fact and guard against it in advance. The filling must leave him so shaped that it will not be disturbed by the closing of the jaws, even so much as by the production of a slight scratch. Moreover, this immunity must be determined, not alone by the perpendicular action of the jaw, but by the lateral as well. The patient must be asked to gently move the jaw from side to side, as he would do in eating. This brings the cusps of the opposing tooth, or teeth, into all the different relations which they are to bear, and if the filling is unmarred by this, the single warning to chew upon the opposite side during the succeeding day, if obeyed, will bring the filling back in good condition.

But it is often by a cause other than mastication that the filling is broken. We take the utmost care to keep a gold filling free from moisture, yet some men do not hesitate to insert amalgam with the cavity and surrounding parts flooded with saliva. This so-called submarine work not only should not be practiced, but a clinician showing it before assembled students, or practitioners, should be roundly condemned. In contour work with amalgam it is of the utmost importance that the perfect crystallization of the mass should not be interfered with by moisture. The filling should be kept dry throughout the whole operation, if possible. Where the cavity extends far beneath the gum-margin, the tooth may be filled in two operations, though at the same sitting. Using the napkin as a dam, amalgam must be packed until it extends beyond the margin, sufficiently far so that the rubber-dam may be placed. Then the cavity, and the amalgam already in place, may be dried and the filling continued. Thus it is shown that because a cavity cannot be kept dry with rubber-dam from the outset, that is no reason why the filling should be allowed to become inundated several times, through a vain effort to control moisture with a napkin.

The next important point is to avoid fracturing the mass during the operation. This involves simply the proper application of force, and the proper consistency of the material. Amalgam, for use in a large contour, must be prepared slightly more plastic than for ordinary work. It is to be packed with balls of bibulous paper, with a wiping motion, thus forcing the material against the cavity-walls, as long as this action can be carried out. By this course the excess of mercury is forced out, and crystallization begins at once. Thenceforth the particles of that portion of the mass already in position *must not be disturbed.* If by exerting force in a wrong direction a part of the filling is fractured off, *it is folly to hope to get a good result by patting it back with a burnisher. The reunion will not be as strong as was the original union.* It would be better, where the accident does occur, to remove the separated piece, replacing it with freshly-mixed material. To give accurate direction on this point I must resort to a diagram. Fig. 86 shows a large contour partly completed. The dotted line shows the extent to which it is to be carried.

Whether the remainder of the filling be packed with bibulous paper or with burnisher, it is from this point on that fracture is to be feared. The rule is very simple. *Pressure must be exerted only in line with the greatest resistance, offered by the tooth itself.* To pack the amalgam in the direction indicated by the arrow *a* would be safe, whereas to follow the direction shown by the arrow *b* would be to invite failure.

FIG. 86.



The last essential is to dismiss the filling as far advanced toward crystallization as possible. This may be best accomplished by burnishing gold into it, as has been previously described on page 24 (January).

Oxyphosphate of Zinc.—This is a material rarely depended upon for extensive contour work. Yet there are two special conditions in which it may be made extremely useful. I once was applied to by an actress who had lost the corner of a central incisor. The tooth was unusually large, and the missing portion extensive. A gold corner would have been very noticeable to her audiences, and would not be tolerated by herself. It is possible that at some time in the future porcelain fillings will have been brought to such a stage of perfection that a case of this kind can be readily handled. The lady, however, came to me long before such work was even advocated. She simply asked me to restore the tooth with what she termed "bone-filling," and I did so, using considerable care to obtain as perfect match to color as possible, and succeeding fairly well. I replaced this in less than a year. It must be remembered that as soon as a small part of the mass had disintegrated the contour was obliterated, so that refilling in this position would be needed more frequently than ordinarily. The third time that I was asked to fill this tooth, I observed that the wasting away was mainly from the palatal side, outward. This compelled me to think a little, and I devised a mode of procedure which I have since followed in similar conditions, with most gratifying results. I first restored the shape of the tooth as before, using an oxyphosphate. This done, I burnished a thin piece of tin over the palatal portion of the filling, extending it partly around the approximal surface, and over the cutting-edge, trimming it to shape. With this as a pattern, I cut out a similar piece from thin gold (24-k.) plate, and treated it in the same way, thus fashioning a tray which would hold the material, and protect it wherever it was covered. This bit of gold was then soldered where the two turned edges came together at the angle of the corner, and a thin layer of solder flowed along the inner side. Into it were then dropped stray bits of gold, or platinum, and when heated up once more these were caught and held by the solder, producing a roughened inner surface. The filling was then removed entirely from the tooth. Its first insertion was intended only to serve for molding the gold tray. The gold tray was then held in place against the corner of the tooth, and fresh oxyphosphate inserted. When this was hardened the whole was finished with sand-paper disks, and presented the appearance, from the palatal aspect, of any ordinary gold filling, while labially we had the oxyphosphate simulating the tooth in color. In Fig. 87 is shown a tooth prepared for filling, the gold tray in position to receive the phosphate. Fig. 88 shows the tray itself, and the inner surface here represented with loops. One or two pins from old porcelain teeth, soldered into the tray, serve as well as any other means of obtaining a point for the phosphate to adhere against.

Another condition where extensive contours may be safely effected mainly with oxyphosphate, is where a large portion of a tooth being missing, let us suppose that we find the tooth itself intensely sensitive, so that we should hesitate to insert a metallic filling. Or the patient may be of such temperament that it would be hazardous or injudicious to compel as long a sitting as would be necessary for the insertion of gold. It may be desirable to reject amalgam, because the location is such that it would show, as for example the anterior approximal surface of a superior first molar, or one of the bicuspids. The plan that I have followed with success is to temporarily restore the shape of the tooth by inserting an oxyphosphate filling. Next I take an impression and dismiss the patient. During his absence I mold pure gold plate over the plaster model, forming a contoured cap to cover the oxyphosphate, which I insert at the next sitting. The inner side of this cap is treated as before, either with pins or loops soldered in. Fig. 89 shows a molar thus filled, the appearance being simply that of a gold contour filling, because the edges are polished down to the finest taper, which can be done so nicely that the point of an explorer will pass over them, and silk not catch under the gingival margin. Fig. 90 shows the cap with loops within.

FIG. 87.

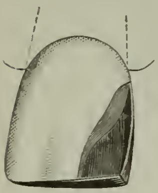


FIG. 88.

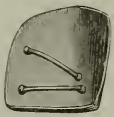


FIG. 89.

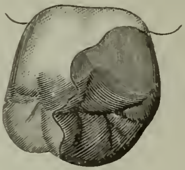
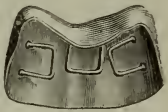


FIG. 90.



It may be as well mentioned here as elsewhere, though not strictly speaking in the nature of contour work,—though all restoration may be so counted,—that these caps for oxyphosphate become invaluable in the treatment of *children's* permanent teeth. When the little ones come to us with gaping cavities in their sixth-year molars, what are we to do? We frequently find extensive caries without real exposure of the pulp. It is greatly desirable to save these teeth alive, as a dead pulp in a sixth-year molar, at this time, even though thoroughly removed, may almost surely be counted a forerunner of an abscess later in life, and probable loss of the tooth before the age of twenty-five. So far from considering these teeth good subjects for extraction, I take unusual pains to save them. I think this can be accomplished with oxyphosphate better than with anything else. Here again I fill the cavity temporarily, in this condition placing cotton, which carries a medicament first, and covering with gutta-percha or temporary stopping, carving the same into fair shape for mastication. I then take an impression, and if it be necessary make dies and swage a piece of pure gold to cap my cavity and give me a good masticating surface. Fig. 91 shows a tooth so filled, and Fig. 92 the cap with loop. These caps should *never* be made to do service over *gutta-percha*, as that material by swelling may dislodge the gold covering. In all cases the edges should be as thoroughly polished down as though it were a true gold filling.

FIG. 91.

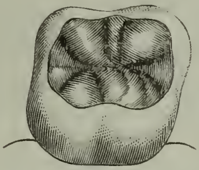
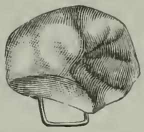


FIG. 92.



The Use of Screws.—The judicious use of screws in connection with the restoration of teeth which have been badly decayed, enables us to save permanently many teeth which would otherwise be lost—or crowned. The screw first comes into play when caries has advanced so far that any preparation of the cavity, removing tooth-substance, in order to obtain retentive shape, would leave the remaining portion so weakened that fracture subsequent to or during the filling operation would be rendered probable. Again we resort to the screw when necessary excavation might too nearly approach, or even expose the pulp itself. A case which combines both of these possibilities is shown in Fig. 93, which is a lateral incisor from which both corners have been removed by carious action. Supposing that the pulp were alive in such a case, I think it better to restore by gold contours than to crown, even where crowning could be accomplished without destruction of the pulp. Using the How drills, taps, and gold screws, a threaded hole is drilled in the tooth, care being taken neither to enter the pulp-chamber, nor to pass through the side. The screw is then turned into place tightly and cut off long enough to reach almost to the end of the corner which is to be builded on. The figure shows the screws in position. To secure permanent results, the greatest skill and care are requisite in filling around the screw. Only very small pieces should be used, and each of these should be thoroughly condensed. As a screw renders an operation doubly difficult, it should be resorted to only in cases of absolute necessity. Fig. 94 shows a good arrangement of screws in a molar, the pulp being alive, and the tooth so sensitive that proper excavation of the cavity becomes of doubtful expediency. Here we have four screws so placed that they assist one

FIG. 93.

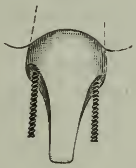


FIG. 94.

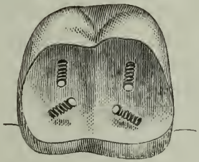
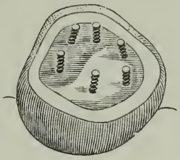


FIG. 95.



another. Where it is designed to depend upon amalgam, a screw of platinum and iridium is preferable to one of gold, which could be readily destroyed by amalgamation. We sometimes find molars badly scooped out from erosion or attrition (which is the true cause, is yet undecided). Occasionally these places are extremely sensitive. Here screws may be depended upon to do good service. I have placed as many as six in a single tooth, as shown in Fig. 95, which represents a molar ready to receive the amalgam, no undercutting having been attempted, reliance being placed entirely upon the screws.

In concluding this subject, I will give a few odd cases from practice which may indicate the unusual application of principles which become necessary in unique cases.

Case 1. A young lady visiting the city called upon me with the statement that she had fallen and broken a lateral incisor. Her dentist, in the city where she resided, did not care to undertake the operation, and as she was about to visit New York kindly gave her my address. Examination showed that the tooth, if a lateral incisor at all, was misshapen, being indeed a supernumerary tooth. Though narrow, its loss would have been deplorable, because the arch was well curved and filled with teeth regularly placed. The fracture had removed about one-quarter of the crown, yet the pulp had not become exposed thereby. The end of the tooth was broken off square, and being small in proportion to the length of the restoration required, made the chances of success next to impossible if any attempt were made to form a cavity by undercutting, which should retain the filling without danger to the pulp. I built down a full contour, retaining it entirely by three screws. The arrangement before filling is shown in Fig. 96, and the restored end in Fig. 97. To start the filling, I took a narrow rope of gold and wove it between and around the screws.

Fig. 96.

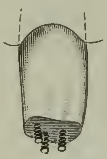


Fig. 97.

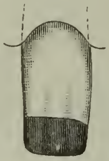


Fig. 98.

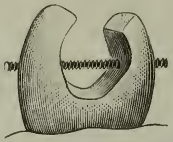
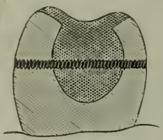


Fig. 99.



Case 2. This case exemplifies another use of a screw. The patient was a young man, and the tooth a first bicuspid. Approximal cavities had approached each other till the cavity extended through from front to back, as seen in Fig. 98, which also shows the disposition which I made of a screw. The labial and palatal walls were so weak that they could be sprung together slightly between the fingers, so that I feared fracture from the force of mastication. As an additional precaution, the edges of the natural cusps were slightly beveled, so that after filling they were capped and protected by the gold, as shown in Fig. 99. The ends of the screw were ground off after filling, appearing like small fillings.

Case 3. A young woman of twenty, of comely features, applied to me to have a gold crown placed over a first bicuspid. Examination showed very extensive decay along the posterior approximal portion, which also extended so far up under the gum-margin that not only would it have been difficult, but I thought that it would even have been impossible to successfully crown the root after cutting off what was left of the natural crown. The condition is shown in Fig. 100, where it is seen that the cavity involves the root as well as the crown. The natural crown itself offers poor support for a filling, yet this tooth was successfully contoured, and is doing good service now, seven years later. It is manifest that the rubber-dam could not be forced above the gingival margin. The procedure therefore was to secure a stout platinum and iridium screw into the root-canal, the pulp having been removed before I saw the case. Around this, amalgam was packed until it protruded sufficiently to allow the dam to be placed. At the next sitting the contour was completed with gold, the dam being placed first, and then all the amalgam cut away except just sufficient to allow the dam to remain in position. Fig. 101 is a section showing the relation between screw, amalgam, and gold.

FIG. 100.

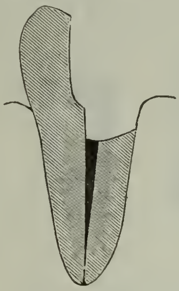
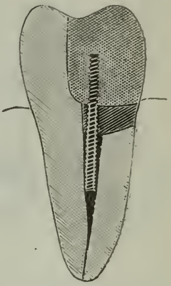
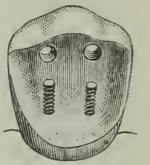


FIG. 101.



Case 4. A young man came to me on one occasion with a first superior molar from which the crown was lost except the buccal wall, yet the pulp was alive. A good, serviceable restoration was made without cutting away the tooth to any material extent. Along the palatal margin two iridiumized platinum screws were placed, and through the buccal wall itself two holes were drilled. This wall was strong, and yet of such form that it was safer to resort to this method than it would have been to make an attempt to undercut it for retaining grooves. Fig. 102 shows the tooth as prepared for filling. These holes were beveled at the buccal side so that when the amalgam was placed it extended through, forming headed pins, which materially added to the strength of the operation.

FIG. 102.



Case 5. A married woman of forty came to me for a lower set of teeth. She still had the six anterior teeth below, but they were in such a state of dilapidation that she wished them extracted. Examination showed that though badly decayed along anterior and posterior approximal sides, in every instance the pulp was alive. For this reason, and because I considered that a partial lower plate would give better service than a full denture, I advised saving the natural teeth. In every case, I found the teeth so narrow and the cavities so extensive that I despaired of being able to build on the necessary corners, with any hope of having them endure. Finally I resorted to a plan which proved successful. One case will serve for illustration. Fig. 103 shows a lower incisor after the removal of decay. It is seen to be similar to the superior lateral incisor shown in Fig. 93, where screws were resorted to. This could not be done in the lower because of the danger of entering the pulp-chamber. What I did was to connect the cavities above and below, cutting a groove across the incisive edge, and another near the gum at the labial aspect. The cavity pre-

pared for filling is shown in Fig. 104, and the full contour in Fig. 105.

FIG. 103.

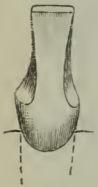


FIG. 104.

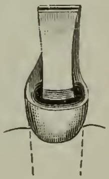


FIG. 105.

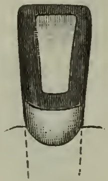


FIG. 106.

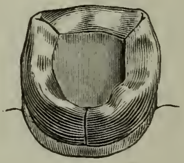
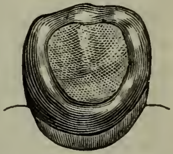


FIG. 107.



Case 6. A young girl of about fourteen presented with a lower sixth-year molar, from which all of the crown was absent, the pulps, however, being still alive. These cases are by no means uncommon. Of course, where the patients can afford it, they may be crowned with gold, but even then it is doubtful whether such an operation would be as serviceable as the one which I am about to describe, for two reasons: First, the fact that by the method of filling *the dam is in position when the cement is used;* and, secondly, a better occlusion can be obtained *where the "bite" is short.* I made a band of gold to fit around the tooth, wide enough so that when in place it prevented closure of the jaws. It was then removed, and the upper edge turned inward slightly all around. Replaced about the tooth, closure of the jaws pressed the bent edges down until the occlusion was perfect. The tooth with band thus turned in to adapt itself to the occlusion is shown in Fig. 106. The dam was next adjusted, and cement placed along the inner side of the band and covering the floor of the cavity thus formed. Before this was allowed to set, amalgam was used to complete the contour. This cement not only served to secure the superstructure to the root, but it protected the gold band from the action of the mercury in the amalgam. When trimmed up and polished, a handsome and serviceable crown resulted, as shown in Fig. 107.

FIG. 108.

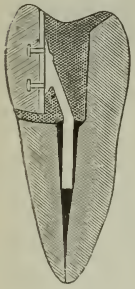
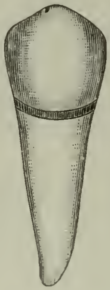


FIG. 109.



Case 7. A young woman presented with a first bicuspid from which the entire labial portion had been lost. The tooth was pulpless. I ground a porcelain cuspid to fit fairly well into the place of the missing labial wall, and to this, when backed, soldered a stout platinum bar, which extended down into the root. This was set with oxyphosphate and the patient dismissed. At the next sitting the dam was placed, and the phosphate removed sufficiently to allow a thorough filling of gold. Next a groove was cut between the porcelain face and the tooth where they came into contact at the labial gum-margin, and this joint was made perfect by gold filling. Fig. 108 shows a section representing the relation between porcelain face pin, phosphate, and gold, and Fig. 109 shows the appearance from the labial aspect, the porcelain face, and the gold at the joint being seen.

(To be continued.)

PROCEEDINGS OF DENTAL SOCIETIES.

FIRST DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

THE First District Dental Society of the State of New York held a regular monthly meeting Tuesday evening, February 9, 1892, at the New York Academy of Medicine, No. 17 West Forty-third street. The president, Dr. Norman W. Kingsley, in the chair.

CLINIC REPORTS.

Dr. Louis C. Le Roy, of the clinic committee, reported that at the clinic held December 8, 1891, at The S. S. White Dental Manufacturing Co.'s depot in the Lincoln Building, Nos. 1 and 3 Union Square, West, there were one hundred and eight present to witness the different operations and displays. Dr. George Roussel, of Paris, France, filled a right upper molar having a cavity in its crown and anterior approximal surface, using Wolrab's gold, soft, to line cavity throughout, and in the center and the surface of filling the same gold made cohesive by annealing. The operator seemed to exhibit much skill, and judging from other contour work done by him in the same mouth, this filling will do good service. . . . Dr. T. O. Oliver, of New York, displayed a very ingenious appliance, a "Rotary Blower," a compact affair of about one and a half inches in diameter, operated by lathe power, designed for soldering, chip-blowing, or for any purpose where we ordinarily use a blast. It would seem to be a valuable addition to our professional appliances. . . . Dr. A. McCollom filled a cavity in a right superior central incisor with Globe foil, using hand-pressure and automatic mallet for condensing. The finished operation was a beautiful one. . . . Dr. H. W. Northrop, of New York, presented a patient for whom he had inserted crown- and bridge-work eighteen months previously. The case was a thoroughly practical one, and demonstrated the utility of bridge- and overhang-work. In the upper arch was a bridge of eleven teeth extending from the second molar on the left side to the first bicuspid on the right. Perfect adjustment and adaptation marked the whole. The attachments for this piece of work were five, and a span between the cuspids. There were two pieces in the lower bridge-work, on the right side an extension piece carrying two teeth beyond the attachment supported by a small metal saddle resting upon the gum. There was not the slightest evidence of inflammation apparent. A few teeth in the lower arch had individual crowns. Twenty-two carat or coin gold was principally used in the construction of these appliances. The workmanship was generally admired, and some very encouraging comments were made by men experienced in this particular branch. The work had the appearance of new, and the gums were thoroughly healthy. . . . The S. S. White Dental Manufacturing Company showed their electrical exhibit, and had the Kells system in operation. The current was supplied from the incandescent circuit, operating engine-arm, Bonwill mechanical mallet, electric mallet, laryngoscope, and lamps generally. Some finished operations with their new Crystal Mat Gold, a form of crystal gold, were shown. The fillings appeared to be very dense. There were some pretty specimens of contour work. The working parts of The S. S. White

Wilkerson chair were shown in section, and also the different hand-pieces and right-angle attachments for the engine.

Dr. F. A. Roy, chairman of the clinic committee, read the following report of the February clinic: The regular monthly clinic was held this afternoon at The S. S. White Dental Manufacturing Company's depot in the Lincoln Building, Nos. 1 and 3 Union Square, West. Dr. J. B. Meeker, of New York, filled an anterior approximal cavity in the right superior second bicuspid, making a very pretty contoured gold filling. He also placed a crown on the first bicuspid, made with square pin and the usual band, and with a gold cusp plate to protect the porcelain face. This was a very practical case, and seemed a perfect success. . . . Dr. Virgilio Z. Bazan, of New York, showed his procedure for immediate root-filling, first syringing the tooth with a solution of permanganate of potash, then applying a solution of bichloride of mercury 1 to 2000, and following with absolute alcohol to dehydrate the dentine. The doctor uses Donaldson bristles, and plain jewelers' broaches tempered to suit himself, and a hot-air syringe operated by the foot having a shield of hard rubber to protect the patient's lips; he uses also the Evans root-drier. Having dried the root, it is his custom to saturate it with oil of cassia, and fill with floss silk which has been saturated with a solution of gutta-percha, oil of cassia, and balsam of Peru. The filling of the case in hand was deferred, as living tissue was present in the roots. . . . Dr. C. Edmund Kells, Jr., of New Orleans, sent for exhibition his root-gauge for carrying a bristle or broach and gauging the length of the root-canal. It is made of a fine tube and set-screw, by which, the length of the root having been determined, a broach may be fixed at that length during an operation. The instrument is much smaller than any others made, and does not obstruct the view while in use. . . . Monroe Griswold, D.D.S., of Hartford, Conn., showed his new pinless crown. Any sort of porcelain tooth may be ground to fit the root, and then is coated with gold by melting or baking on it a precipitated gold prepared in some mixture to allow it to be spread on. The root is then filled with amalgam, and the gold base of the crown also spread with amalgam, and the crown is placed in position and held till sure of attachment, the patient being cautioned as to use and occlusion guarded against by a mouth-prop for a half-hour or more, according to the setting of filling. Dr. Griswold recommends his own amalgam as best suited to this work. . . . Dr. R. G. Stanbrough, of New York, showed his new mandrel and disk. Each disk is sold with a brass center, so that there is no head or screw to the mandrel to be lost. Lugs on the brass center engage with lugs on the mandrel, and a button enters the hole in the disk, while a small spring holds the disk against the button. . . . Dr. J. C. Johnson, of Kennett Square, Pa., sent on by Dr. Gage a disk mandrel with a square pin and two lugs on the head, which was held in place by a clutch fastened by a sliding ring. . . . Dr. Peck showed his tape- or strip-carrier. . . . Dr. F. A. Roy showed a simple rubber bench-pin.

Incidents of Office Practice.

Dr. Rufus G. Stanbrough. I would like to exhibit a piece of necrosed bone which I removed from the inferior maxilla of a child a little over three years of age. The necrosis followed an attack of measles. Upon removing the necrosed bone there seemed to be a new formation under it. I think in course of time the child will have use of the jaw.

The paper of the evening was then read by Dr. Rodrigues Ottolengui, on "The Code of Ethics in its Relation to the Present Needs of the Dental Profession."*

Discussion.

Dr. W. H. Dwinelle. This is a subject which I hardly think needs any discussion. So far as the paper is concerned, I heartily approve of it. The sentiments expressed in it are such as have been expressed time and again by others whose criticism and approval we should accept. The question is one that has perplexed the profession generally, and it seems no nearer of settlement to-day than it was at the beginning.

I think the code of ethics has been tinkered with too much, without reaching a satisfactory conclusion. It seems to me that general principles of equity and common sense should be a sufficient guide to us in our relations with each other. I am reminded of some advice given me by my father at the outset of my career, and of one thing which I consider particularly wise, when he said, "Remember that nothing is settled until it is settled right, else you must go back and revise it." I think we are too apt to be governed by prejudice and feeling, and thus allow the interest of the profession at large to be sacrificed to personalities. In so doing, I think we pay too high a compliment to the individual against whom our prejudice is directed. What we need is more breadth, more liberality, more charity, more consideration for the cause. The trend of the paper is in a direction that we should all approve, and I hope that it, with other influences, will tend to give greater breadth, greater charity, and greater wisdom to the code of ethics which governs us.

Dr. F. A. Roy. I think, while the general sentiment of the profession has been that something should be done in regard to the code of ethics, some even believing that we should drop it altogether, many do not realize that there is a new code growing up. We have now dental laws which were not in existence twenty years ago.

Dr. Geo. A. Mills. Dr. Ottolengui has written a great many papers, but I do not think he has written any that will attract so much attention as this. I have been an active dentist for thirty-eight years, and I have mingled a great deal with dentists, and I think that if this question were put to all intelligent dentists, the great majority would vote for no code of ethics at all. I have always been on record as opposed to the code of ethics. I think there has been much injustice and a great want of dignity in carrying out the code. Dr. Atkinson used to say that the men who advocated the code were those who needed it most. I have never known an instance where men have been brought up before societies on charges that it was not a matter of spite. We have a mission higher than tearing each other down. My heart aches to see men plotting and planning to destroy each other in our profession. We all have our faults and our weaknesses, but, gentlemen, we all need charity for each other. Ethics means simply doing right, and nothing else; but are the men who claim to be gentlemen, and the men who claim to be ethical, and the men who claim to be Christians, dealing with the question according to their consciences?

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*See page 366, current number.

I believe Dr. Ottolengui's paper will be read more widely than any paper ever published by him. I hope by the time we get to the World's Columbian Dental Congress at Chicago we will have a code of ethics that will deal justly with all men, and show ourselves to be true gentlemen.

Dr. E. A. Bogue. Nihilists are not uncommon, and while I must confess that I enjoyed the paper read, and that I fully appreciate and almost agree with many of the ideas enunciated by the essayist, I cannot see that he has put anything particularly new before us, because a long way back, in Sacred Writ, we are told that those who obey do not need law. The essayist announced that perfectly, I think, when he said that a gentleman did not require a code of ethics; but we are not Nihilists, and we believe that law is necessary for those who are not gentlemen.

Dr. M. L. Rhein. After a consultation with Dr. Ottolengui on the disappointment of the essayist whom we had supposed would be prepared for this meeting, I very urgently advised him to write the paper which he has read, and which I heard for the first time this evening. I personally have a feeling of great satisfaction from having urged him to write the paper. I believe, before many years have elapsed, it will reflect a great deal of credit upon the author. There has been quite a misapprehension on the part of the last speaker in regard to one of the main points in that paper. As I understood the author, he is not in favor of abolishing the code of ethics in any professional society, but desires to enlarge its scope to that extent that the man who is clever enough to get just within the pale of not violating the written code can be called to account by any association of which he may be a member, for doing something that he should not do. This ruling applies to most organizations,—to clubs, churches, etc.,—and it would be applicable to a dental or a medical association, provided they drop the written code of ethics, as it is only the establishment of the written code that enables men to do the underhand things that so many of us witness with a feeling of disgust.

This is a subject that has engaged my earnest attention for a number of years, and I was a very earnest supporter of the movement which was carried through by the late Dr. S. O. Vanderpoel, in connection with a list of prominent men in this State, some years ago, by which, at the present day, although Dr. Ottolengui did not say it, the society which has erected this building, the New York Academy of Medicine, as well as the New York State Medical Society, have abolished the written code of ethics. I personally feel a pride in belonging to the organization that took the first step in the medical world of this country toward advancing to that stage, and it is only because we do not see matters in the light that those men have seen it, that we dentists have not long since followed their example. To me, personally, it makes no difference in what manner I am treated by any of my professional confrères; I have never been able to raise a feeling of professional enmity against a man. I say that with as much honesty as any man can make a statement.

In regard to the methods of advertising spoken of by the essayist, I am opposed to every method of what I consider public advertising; but I agree cordially with the sentiments of the author upon the question of sending out pamphlets by members of the profession to their friends and other practitioners, and I think each one should be the judge of his own conduct in such a matter. I, for my part, have published reprints of articles that I have written, and if I write any articles that I consider of sufficient value in the future, I propose again to publish reprints of such articles.

Dr. Geo. Evans. Does the code of ethics prevent the circulation of those reprints?

A member. It does not.

Dr. Evans. Well, it seems to me this is "much ado about nothing." In the paper that was read here this evening, I admire the courage of the essayist. The paper is an interesting one. As to the code of ethics, the American Dental Association is the supreme authority, and every local dental society that expects to obtain representative membership in it must be subservient to it, just the same as our State laws have to be to Congress and to the Constitution of the United States.

The code of ethics of the American Dental Association says that a man must conduct himself as a gentleman, be of good moral character, and he is not to advertise in the public press. According to the paper and discussion this evening, everyone seems to coincide in this. Further discussion on these points is a waste of time. It has taken dentistry two thousand years, through a history more or less reactionary and progressive, to become what it is, and it has taken twenty-five years or more to get the code of ethics and put the practice of dentistry in the form it is here in New York.

If we must have something by which we can gauge a gentleman's conduct, and if the code of ethics of the American Dental Association is not sufficiently effective as it now stands, then revise it. I think that will cover the whole subject.

Dr. Rhein. One word in reply to Dr. Evans. He said that the code of ethics covered everything. The main objection is that it does not cover everything. It limits what it covers by stating what is ungentlemanly. It leaves too many loopholes, but if we adopted an unwritten code there would be no loophole left. To illustrate another point, I would state that at no time has the public in the State of New York been benefited so much by the medical men as they have since the New York State Medical Society abolished the written code of ethics, and the reason is this: that before that time it was impossible for a member of one medical school to consult with another, and I know of numerous instances of the most barbarous treatment of patients, due to the fact that the most prominent men in our midst were unable to grant their services to suffering humanity when it was called for. What are we here for, if not for the benefit of the public?

Adjourned. B. C. NASH, D.D.S., *Secretary*.

MISSISSIPPI VALLEY ASSOCIATION OF DENTAL SURGEONS.

REPORTED BY L. E. CUSTER, D.D.S.

THE forty-ninth annual meeting of the Mississippi Valley Association of Dental Surgeons was held at Cincinnati, O., March 9 to 12, 1892. After routine business and a short address by the president, Dr. L. E. Custer, Dayton, O., a paper was read by Dr. C. M. Wright, Cincinnati, O., entitled "On Edge." He said that under a ceaseless nervous strain for six or eight hours the operative dentist is working upon highly sensitized tissue, and is expending a sympathetic force which keeps him continually on edge. All his operative work requires an unremitting attention ; a constant expenditure of nerve-force in trying to buoy the patient through the operation. The dentist is busy all day at such work. The surgeon ordinarily performs an operation and has rest between that and the next, and so is not so much on edge. He is, however, keenly on edge if one operation immediately follows another throughout the day. The mechanic, who works upon inanimate materials, is less on edge than the surgeon, who has been operating upon live tissue. The mechanical dentist is not on edge as is the operator, because his work is not continuously upon the living subject. An intermediate change of occupation will restore the system to quiet, and so every dentist should have something for recreation in which he delights.

Dr. F. H. Hunter, in opening the discussion, said that all professional men alike were on edge. Any occupation which requires an expenditure of brain- and nerve-force puts a man in such a condition.

Dr. W. N. Morrison attributed this peculiar condition to an electrical interchange between the patient and the operator.

Dr. M. H. Fletcher said that if we can control ourselves we can control our patient.

Dr. W. B. Ames read a paper upon "A New Oxyphosphate for Crown-Setting." Authorities do not satisfactorily explain the various dental cement compositions. Oxide of zinc is the common base. There is a very limited number of metallic oxides which have the property of forming a cement in combination with phosphoric acid and water. The oxides of zinc, copper, and mercury only, according to his experiments, have this property. Mercury is dangerous, and so he presents copper, of which there are two oxides, the cuprous and the cupric or black. The cuprous is worthless for dental purposes, but the black oxide forms a cement of sufficient hardness and stability to give promise of good results ; the only objection is its jet-black color. A larger proportion of powder may be used in mixing with the phosphoric acid than is used in zinc cements. It crystallizes very slowly when kept cool, but immediately sets when warmed. This is a valuable property when used in bridge-work. This material possesses a flinty hardness not met with in other cements. It does not stain the tooth if the oxide contains no free copper. During crystallization phosphate of copper is formed, which is a powerful antiseptic.

In the discussion of Dr. Ames's paper by Drs. J. S. Cassidy, W. N. Morrison, O. N. Heise, H. T. Smith, and Dr. Ames, it was developed that a pure oxide does not stain tooth-material, but a little free copper will stain very rapidly. This stain is a permanent antiseptic, and in children's teeth it is so deep as to resist decay if the filling is subsequently lost.

Dr. Frank W. Sage, Cincinnati, O., read a paper upon "Discrimination in the Performance of Dental Operations." The student learns by practice that he must use judgment in his work. His teaching at college was good, but he lacks a knowledge of those things which constitute keen foresight. A man may be a very skillful operator, but if he lacks judgment he will fail ; on the other hand, a man of ordinary ability, with good judgment and ingenuity, will be comparatively successful. Many things must be taken into consideration, as health, climatic environment, temperament, condition of associated parts, etc. He related the incidents of an extensive operation upon the few remaining front teeth, which was ruined in a short time by the patient neglecting to wear artificial substitutes for the missing ones, so that all the work fell upon the front teeth.

Dr. H. A. Smith, after defending the dental teacher, said that no operation is a failure which saves the teeth, even if it must be done over time and again.

Dr. G. S. Junkerman, Cincinnati, O., read a paper upon "Surgery of the Antrum." After giving the anatomy of this sinus, he said it was subject to such lesions as are common to mucous membranes generally, and is to be treated in a similar manner. It is not exempt from the formation of tumors, mechanical injuries, and abscesses. There are three ways of entering it, of which only two are practical. Besides the natural foramen, entrance is generally gained by trephining through the anterior portion at the canine fossa or at its base through the alveolar process. During treatment there must be free drainage and the use of antiseptics.

Dr. Wm. Knight opened the discussion by saying that antra often differ in size and shape in the same face. They are frequently subject to epithelioma, and are sometimes the source of eye-trouble. He had noticed that the odor is often only recognized by the patient. Neuralgic pain over the antrum, shooting toward the eye, indicates antral trouble. He prefers entering the antrum through the anterior wall in edentulous persons.

Dr. H. A. Smith, Cincinnati, O., read a paper upon "Injury to the Superior Incisor Teeth : Supposed Agency of Phagocytes in effecting a Cure." He gave the history of a case of an injury causing the death of the pulps of the anterior teeth without alveolar abscess. Here was a weak point and a favorable opportunity for micro-organisms to act, but there was no other sign after the disappearance of the soreness than a slight discoloration. He attributed it to the action of leucocytes, or, as they are now called in this connection, phagocytes. They destroyed the micro-organisms and ptomaines.

Dr. C. M. Wright said it was not yet settled as to what a phagocyte is and what pus is, and he could not agree entirely with the paper.

Dr. J. S. Cassidy quoted the variant authorities in bacteriology, but failed to effect a compromise.

Dr. Wm. Knight, Cincinnati, O., read a paper upon "Ankylosis." This lesion is generally produced by cicatrization following an injury to the articulation, or by a tumor. It is very seldom permanently relieved. The best results are produced by an artificial joint in front of the lesion ; this is more successful when the temporo-maxillary articulation is the seat of the lesion. When an artificial joint is established, the articulating surfaces become covered with a fibro-cartilaginous or fibro-ligamentous structure which secretes a fluid similar to synovia. Dr. Knight exhibited a patient with ankylosis of the inferior maxilla of several years' standing, which had been operated upon by severing the rami and establishing a double joint of one-eighth-inch movement in the molar region. The patient being young and the jaw atrophied by inactivity, the movement will probably be increased as the jaw develops.

The paper was discussed by Drs. Harlan, Smith, Wright, and others.

Dr. Grant Mollyneaux, of Cincinnati, O., read a paper upon "The Mechanical Treatment of Cleft Palate." He gave an excellent paper upon this subject, including the essentials of vocalization. He showed the relations of the associated parts, and the action of mechanical appliances for supplying deficiencies of these parts. The devices were shown in their relation to the mechanism of speech. The construction can be made of infinite value if a hard rubber appliance is so constructed as to utilize the controlling muscles. After an appliance has been supplied, the training should commence with the vowels. A course under a singing teacher is one of the best methods of learning to articulate. The paper ended with the following conclusions: 1. The employment of flexible rubber vela or any appliance dependent upon the action of the soft palate as given in books is incorrect. 2. Flexible rubber does not make a permanent appliance. 3. Flexible rubber keeps up a constant irritation. 4. Shaping the pharyngeal portion gradually and according to the judgment of the operator is not productive of the best results. 5. An appliance can be inserted at first as large as can ever be worn. 6. Resonance is never complete with flexible rubber.

Dr. W. B. Ames, in opening the discussion, said that in his first work on cleft palate he was of the opinion that something of the kind described in the paper was a better method than flexible vela, but had not been able to carry it to the degree of perfection here shown. The appliance must completely separate the oral from the nasal cavity. He had used soft rubber, but found the same objections as Dr. Mollyneaux mentioned, and so prefers hard rubber.

In the evening Dr. M. H. Fletcher, of Cincinnati, gave a popular lecture upon "The Skin and its Appendages, with Special Reference to the Development of the Teeth." The lecture was illustrated by lantern. He showed how the different tissues are developed from the foldings of the three layers of the blastoderm. The relations of the different dermal appendages, as well as the development of the teeth, were clearly demonstrated.

Dr. J. Taft read a communication from Dr. A. O. Rawls, of Lexington, Ky., upon "Discoloration of Dentine." He referred to the action of trichloride of iodine and pyoktanin used in pulp-canals. These agents frequently stain so badly that their use is contraindicated in this connection.

The discussions by Drs. Taft, Smith, and others were in opposition to the use of such agents when we have so many equally effective ones which do not stain.

Dr. O. N. Heise, of Cincinnati, O., read a paper upon "Pental, the New Anesthetic." He gave a review of the three papers upon this agent by Dr. Hollaender, of Halle, and said the pental as now manufactured is quite different in its effects from that formerly tried. This is probably due to its greater purity. Pental is not its chemical name, but is that given to it by the German manufacturer, C. A. Kahlbaum, and the article is only obtainable from him. The high price forbids its general use at present.

Dr. J. S. Cassidy said the physiological action of this agent, as stated by Dr. Heise, is probably due to its decomposition into carbonic acid and water, and it is the carbonic acid that anesthetizes. The high price is largely due to the cost of purification.

At the clinics Dr. W. B. Ames demonstrated the manner of manipulating oxyphosphate of copper. Dr. O. N. Heise administered pental to a number of patients, with apparent success in all the cases. Dr. A. E. Mehaffey constructed a bridge, replacing the central incisors. Dr. J. E. Barriclow demonstrated his method of administering nitrous oxide. Dr. H. T. Smith showed the use of the Bonwill mechanical mallet with electric motor power. Dr. Kerr demonstrated the Dowine gas and gasoline furnaces for baking small porcelain pieces ; also the Dowine gasoline blow-pipe.

The following officers were elected for the ensuing year : O. N. Heise, Cincinnati, O., president ; W. B. Ames, Chicago, Ill., first vice-president ; A. G. Rose, Cincinnati, O., second vice-president ; H. C. Matlack, Cincinnati, O., corresponding secretary ; H. T. Smith, Cincinnati, O., recording secretary ; F. A. Hunter, Cincinnati, O., treasurer.

VERMONT STATE DENTAL SOCIETY.

THE sixteenth annual meeting of the Vermont State Dental Society was held at the Van Ness House, Burlington, Vt., March 16 to 18, 1892.

The following officers were elected for the ensuing year : G. F. Cheney, president ; A. J. Parker, first vice-president ; W. H. Wright, second vice-president ; Thomas Mound, secretary ; W. H. Munsell, treasurer ; E. O. Blanchard, G. O. Webster, and C. W. Staples, executive committee ; G. W. Hoffman, state prosecutor.

A committee, consisting of Drs. J. L. Perkins, R. M. Chase, and G. F. Cheney, presented a touching memorial tribute of respect to the memory of the late Dr. W. H. Atkinson, who was an honorary member of the society. He was characterized as a "master mind, with a keen and swift insight into the heart of things ; a grand and sincere man, a man of integrity, and an honor to the dental profession."

The next meeting was appointed to be held at St. Albans, on the third Wednesday in March, 1893.

THOMAS MOUND, *Secretary*,
Rutland, Vt.

CHICAGO DENTAL SOCIETY.

AT the annual meeting of the Chicago Dental Society, held Tuesday evening, April 5, 1892, the following officers were elected for the ensuing year : J. W. Wassall, president ; Thos. L. Gilmer, first vice-president ; E. A. Royce, second vice-president ; L. L. Davis, recording secretary; Geo. J. Dennis, corresponding secretary; E. D. Swain, treasurer; J. H. Smyzer, librarian; G. H. Cushing, E. Noyes, J. G. Reid, board of directors; A. H. Peck, B. D. Wikoff, D. M. Gallie, board of censors.

Geo. J. Dennis, *Corresponding Secretary*,
Michigan avenue and Thirty-first street, Chicago.

MISSOURI DENTAL COLLEGE ALUMNI ASSOCIATION.

The Missouri Dental College Alumni Association (dental department of the Washington University) held its annual meeting at the College Building, St. Louis, Mo., on commencement day, Thursday, March 10, 1892, at 4 P.M.

After routine business, and the election of eighteen new members, the following officers were chosen for the ensuing year: De Courcey Lindsley, president; James B. Newby, vice-president; G. W. Applegate, secretary; Carl E. Schumacher, treasurer; W. M. Bartlett, J. B. Newby, and P. F. Helmuth, executive committee.

De Courcey Lindsley, *Secretary*.

ALUMNI ASSOCIATION, CHICAGO COLLEGE OF DENTAL SURGERY.

At the last meeting of the Alumni Association of the Chicago College of Dental Surgery, a committee, consisting of Drs. T. A. Broadbent and C. H. Wright, reported resolutions, which were passed, deploring the loss of the following deceased "worthy and respected members" who have passed away since the formation of the association: Drs. J. Grant Emery, William Witt, G. E. Brownlee, E. J. Kantsky, A. G. Moffett, E. B. Ward, Joseph A. Swasey, and D. W. Runkel.

The following officers were elected for the ensuing year: C. E. Bentley, president: A. H. Peck, first vice-president; D. W. Gallie, second vice-president; A. B. Allen, third vice-president; W. T. Reeves, fourth vice-president; U. G. Poyer, secretary-treasurer, No. 882 W. Madison street, Chicago.

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DENTAL COLLEGE COMMENCEMENTS.

BALTIMORE COLLEGE OF DENTAL SURGERY.

The fifty-second annual commencement exercises of the Baltimore College of Dental Surgery were held at the Lyceum Theater, Baltimore, Md., on Monday evening, March 21, 1892.

The annual oration was delivered by the Rev. F. M. Ellis, and the valedictory by Philip Ernest Sasscer, D.D.S.

The number of matriculates for the session was one hundred and eighty-one.

The degree of D.D.S. was conferred on the following graduates by Professor R. B. Winder, dean of the faculty:

NAME.	STATE OR COUNTRY.
Benj. D. Altemus	Pennsylvania.
Charles W. Arird	Pennsylvania.
John N. Baker	Pennsylvania.
Irwin J. Beach	Maryland.
William J. Beatty	Pennsylvania.
Charles A. Bland	North Carolina.
Charles W. Boucher	Maryland.
H. V. Bradshaw	Pennsylvania.
B. Bridgforth	Virginia.
Burt B. Brumbaugh	Pennsylvania.
James C. Buchanan	Pennsylvania.
William C. Callahan	New York.
Walter C. Carter	Missouri.
F. A. Charles	Massachusetts.
Charles A. Cochel	Maryland.
Robert S. Cole	North Carolina.
Edwin Davis	Pennsylvania.
Willey C. Dawson	West Virginia.
Jacob W. Derlin	Maryland.
J.S.Donaldson,D.D.S.	Colorado.
J.R.Donaldson,D.D.S.	Colorado.
Harry Donnan	Pennsylvania.
Benj. F. Dulaney	Texas.
Nelson H. Ehle	Minnesota.
Mortimer L. Fay	New York.
Howard R. Fonda	Vermont.
Harley B. Ford	Canada.
Fred. A. Ford	New York.
Alexander Francis	Maryland.
Isaac A. Frazer	California.
John N. Giddens	Alabama.
Richard L. Gill	Maryland.
W. I. Goodwin	Canada.
Harry W. Graham	Pennsylvania.
Archer C. Griffith	California.
E. Grosheintz, D.D.S.	Switzerland.
Clarkson N. Guyer	Colorado.
George F. Hair	South Carolina.
Charles E. Hamilton	Georgia.
W. I. Hatch, B.A	South Carolina.
Julio Hidalgo	Venezuela.
W. S. Holbrook	New Jersey.
Frank H. Jackman	Connecticut.
A. Jekelfalusy	Wisconsin.
George M. Jones	Iowa.
Earnest P. Keerans	North Carolina.
Clinton Kenney	Connecticut.
F. H. Kestler	California.
Edward T. Ketcham	California.
Harry W. Knauff	Pennsylvania.
Milo D. Kottraba	Pennsylvania.
Robert M. Krebs	Pennsylvania.
Joseph E. La Force	Oregon.
E. T. H. Leonard	Mississippi.
James I. Logan	Alabama.
William S. Long	North Carolina.
William L. Lowe	Pennsylvania.
H. H. Maloney, A.M.	Louisiana.
Edgar W. Marven	Canada.
James W. Moore	Canada.
Simon B. Meyer	Maryland.
Patrick McCabe	Australia.
Charles C. McCloud	Louisiana.
Geo. B. McFarland	East Indies.
William H. McGraw	Pennsylvania.
Peter A. McLean	New Jersey.
Ellis MacDougall	New York.
John E. Parker	Texas.
Leo Arthur Pusey	Virginia.
Edgar K. Rainey	Georgia.
Louis A. Reinhart	Maryland.
Isaac L. Ritter	Pennsylvania.
Robert I. Robertson	Canada.
Ryland O. Sadler	North Carolina.
Philip E. Sasscer	Maryland.
George H. Sayre	New York.
A. S. Shackleford	Texas.
Zadoc P. Shaw	Maine.
John H. Smith	Virginia.
William H. Stokes	New York.
John E. Storey	Texas.
James T. Stuart	Alabama.
Fred. W. Sweezy	New York.
William A. Taylor	Maryland.
Fred. A. Taylor	Canada.
Clarence H. Terry	Texas.
William P. Terry	Louisiana.
Albert G. Tillman	Mississippi.
Eduardo Vasquez	Guatemala.
Henry A. Truxillo	Louisiana.
William H. Walters	Maryland.
Thomas F. Warnes	New York.
Joseph D. Whiteman	Pennsylvania.
Edgar L. Wilder	Vermont.
Benj. H. Williams	Georgia.
David M. Wilson	New York.
Charlie H. Winburn	Georgia.
James I. Woolverton	New Jersey.
Frederic W. Wright	Canada
James A. Yates	Kentucky.
Robert I. Youngs	New York.
Rudolph L. Zelenka	Louisiana.

UNIVERSITY OF MARYLAND—DENTAL DEPARTMENT.

THE annual commencement exercises of the Department of Dental Surgery of the University of Maryland were held at the Lyceum Theater, Baltimore, Md., on Thursday, March 17, 1892.

The mandamus was read by the dean, Ferdinand J. S. Gorgas, M.D., D.D.S.; the address to the graduates was delivered by Rev.

William T. Roberts, of Virginia, and the class oration by H. Janney Nichols, D.D.S. The number of matriculates for the session was one hundred and twenty-seven.

The degree of D.D.S. was conferred on the following graduates by Hon. S. Teackle Wallis, LL.D., provost of the university :

NAME.	STATE OR COUNTRY.
W. Wolsley Alton	Canada.
Walter C. Anderson	Virginia.
Fletcher G. Asbill	South Carolina.
Dabney G. Barnitz	Virginia.
Charles F. Baylis	New York.
John C. C. Beale	Maryland.
Alexander J. Beville	Texas.
Samuel E. Braendle	Canada.
Winfield S. Burd	Pennsylvania.
Andrew S. Burke	Pennsylvania.
W. Bolivar Byers	South Carolina.
E. M. Copenhaver	Virginia.
W. Felton Deekens	Virginia.
J. Harry Deems, Jr.	Maryland.
William W. Dennis	Georgia.
John H. Diddle	West Virginia.
William E. Dobson	New York.
John L. Doremus	France.
Eben B. Edgers	Vermont.
Robert W. Eicholtz	Pennsylvania.
Louis Ewig	Switzerland.
C. Dixie Farriss	Georgia.
Lawrence S. Fox	North Carolina.
Edwin J. Gill	North Carolina.
Eli H. Glasscock	Missouri.
Geo. H. Hargrove	South Carolina.
Oscar J. Harmon	New Hampshire.
Lewis E. Hess	Maryland.
Fred'k C. Humberg	Maryland.
Hugh B. Hutchison	Virginia.
Benj. L. Jefferson	Georgia.
Silas J. Johnson	Virginia.
B. Arthur Jordan	California.
James M. King	Canada.
C. Rogers LeFevre	Maryland.
J. Clinton Macomber	Pennsylvania.
Thomas R. Marshall	Virginia.
Anthony H. Mathieu	Maryland.
W. Glenn McGee	South Carolina.
George A. McGuire	Canada.
Robert J. McHarg	Canada.
J. Morton McIlvain	Maryland.
C. Aug. Mitchell	New York.
Harry B. Mitchell	New York.
H. Janney Nichols	Virginia.
Clyde S. Payne	California.
George C. Probst	South Carolina.
George B. Quinlan	New York.
Turner A. Ramey	West Virginia.
Joseph L. Rathie	Virginia.
E. E. Reynolds	New York.
Jacob Riser	Iowa.
Edmund D. Shaw	New York.
James W. Simpson	Virginia.
Will R. Simpson	South Carolina.
Harry B. Smith	Bermuda.
Charles B. Stouffer	Pennsylvania.
M. Emmert Stover	Pennsylvania.
Arthur O. Thomas	South Carolina.
William A. Thrush	Illinois.
Die P. Tipton	Nebraska.
Arminius W. Totten	North Carolina.
W. H. Van Nostrand	New York.
Harry Van Tassel	South Dakota.
Joseph M. Veza.	Austria.
Frank Von Wachter	Maryland.
J. Willie Watson	West Virginia.
Montg'y L. White	Texas.
Charles G. Wiley	Pennsylvania.
Henry A. Wilson	Maryland.
Edward K. Woods	New Hampshire.
A. W. Woodward	Virginia.
J. Harvey Wool	Virginia.

COLUMBIAN UNIVERSITY—DENTAL DEPARTMENT.

THE fifth annual commencement of the Dental Department of the Columbian University was held, in connection with that of the medical department, at Albaugh's Opera House, Washington, D. C., on Thursday, March 17, 1892, at 2.30 P.M.

The address to the dental graduates was delivered by John B. Rich, D.D.S., and a valedictory was delivered by R. M. Geddings, M.D.

The number of dental matriculates for the session was thirty-five.

The degree of D.D.S. was conferred on the following graduates by J. C. Welling, LL.D., president of the university :

NAME.	STATE OR COUNTRY.
John H. Burch	Dist. of Columbia.
William L. Clark	Dist. of Columbia.
Alva S. Roush, M.D.	Ohio.
Geo. H. Townsend	Virginia.
Carl Trede, M.D.	Germany.

ROYAL COLLEGE OF DENTAL SURGEONS OF ONTARIO.

At the Royal College of Dental Surgeons of Ontario, during the session of 1891–92, there were sixty-four students in attendance. At the recent examinations the degree of L.D.S. (licentiate of dental surgery) was conferred upon the following members of the senior class:

NAME.	RESIDENCE.	NAME.	RESIDENCE.
S. A. Aykroyd	Kingston.	F. A. Lackner, D.D.S.	Berlin.
R. Agnew	Clinton.	H. G. Lake	Toronto.
S. Anderson	Mitchell.	M. A. Morrison	Peterboro.
E. A. Billings	Leamington.	G. J. Musgrove	Wingham.
J. A. Black	Kingston.	F. D. Price	Napanee.
W. A. Burns	St. Thomas.	F. B. Ross	Hamilton.
J A. Edwards, D.D.S.	Uxbridge.	D. C. Smith	Uxbridge.
J. H. Fell	Burlington.	T. C. Trigger.	St. Thomas.
Hermon Hart	Lindsay.	G. A. Walters	Forest.
H. F. Kinsman	Exeter.	W. R. Wilkinson, D.D.S.	Elmira.

All of Ontario.

S. C. Wilson, D.D.S. .... Illinois, U. S.

DENTAL DEPARTMENT, CINCINNATI COLLEGE OF MEDICINE AND SURGERY.

The annual commencement exercises of the Dental Department of the Cincinnati College of Medicine and Surgery were held at the Young Men's Christian Association Hall, Cincinnati, O., on Wednesday evening, March 16, 1892.

Remarks were made by the dean, Professor G. S. Junkerman, M.D., D.D.S., and the faculty valedictory was delivered by Professor A. I. F. Buxbaum, M.D., D.D.S.

The number of matriculates for the session was thirty-four.

The degree of D.D.S. was conferred on the following graduates by Professor George W. Harper, A.M., president of the board of trustees:

Ernest Bragdon, M.D.
James F. Clayton.
B. Frank Corwin.
G. W. Hoffman.
James F. McCamant.
Clifford E Sibbet.
William F. Sloan.
John C. Wallace, M.D.
Sam. H. Wardle.
Fred. G. Williams.

UNITED STATES DENTAL COLLEGE.

The second annual commencement exercises of the U. S. Dental College were held in the Auditorium Recital Hall, Chicago, Ill., on Thursday, March 24, 1892, at 2 o'clock P.M.

Introductory remarks were made by W. H. Prittie, M.D., D.D.S., and an address by W. B. Marcusson, A.M., M.D. The class valedictory was delivered by G. C. Stephens, D.D.S., and the doctorate address by J. J. M. Angear, M.D.

The number of matriculates for the session was fifty-seven.

The degree of D.D.S. was conferred on the following graduates by H. J. Reynolds, M.D., president of the board of directors:

Frank A. Carr	Michigan.
Joseph K. Evans	Illinois.
Fred. E. Field	Vermont.
Franklin A. Fry	Indiana.
Preston E. Galloway	New York.
Herbert R. Johnson	Wisconsin.
George J. Marie	Iowa.
Edwin E. Newlin	Illinois.
Geo. H. Richardson	Michigan.
James C. Rupert	Pennsylvania.
Elmer O. Sarber	Iowa.
Geo. C. Stephens	Illinois.
C. E. Schuchert	Illinois.
Elmer G. Smith	Wisconsin.

CHICAGO COLLEGE OF DENTAL SURGERY.

THE tenth annual commencement exercises of the Chicago College of Dental Surgery were held at the Columbia Theater, Chicago, Ill., on Tuesday, March 22, 1892, at 2.30 P.M.

The class valedictory was delivered by Hans Bastian Wiborg, D.D.S., and the doctorate address by C. N. Johnson, L.D.S., D.D.S.

The degree of D.D.S. was conferred on the following graduates by Truman W. Brophy, M.D., D.D.S., dean of the faculty:

Albert B. Allen.
Clarence E. Allshouse.
George H. Anderson.
Gustave E. Anderson.
Hubbard G. Atwater.
Ernest Allin.
Manning A. Birge.
Thomas J. Borland.
Jabez B. Burns.
John L. Bingham.
Lemuel F. Buck.
Calvin F. Besore.
Albert L. Bents.
Samuel H. Baker.
Mark R. Brierly.
Benjamin D. Barber.
John W. Beetham.
Frank C. Colby.
Charles R. Currier.
Harlow A. Cross.
Curtis H. Coe.
Frank L. Condit.
Bert. C. Campbell.
John Corwin.
Robert C. Coy.
Herbert A. Carson.
Orie G. Collins.
Albert P. Condon.
Amos W. Dana.
Will C. Dunn.
James H. Davis.
Claude H. Devereaux.
Frank E. David.
Hiram Darling.
Lewis M. Doerr.
Henry W. Ewing.
Albert E. Eagles.
William E. Ervin.
Walter H. Fox.
Lewis E. Ford.
Allen J. Freeman.
Frank O. Finley.
Herman P. Fischer.
Lawrence S. Fezer.
George E. Franke.
E. M. S. Fernandez.
George R. Guild.
John J. Geary.
Robert Good.
Jeremiah Gochencur.
Francis M. Gray.
Alfred J. Homfeld.
Julian F. Hixon.
Augustus F. Henning.
A. G. Hebberd.
Marion L. Higgins.
Robert A. Howell.
Fred A. Ironside.
Albert H. Johnston.
Albert G. Johnson.
Austin F. James.
Frank King.
Ernest V. Kautsky.
William F. Leu.
Lewis S. La Pierre.
Frank L. Lane.
William A. Lewis.
Hallvard Lie.
William C. Lumpkin.
Oscar E. Meyer.
John F. McCrea.
William E. Martin.
Herman Minges.
John S. McQueen.
John B. Mason.
Henry B. Meade.
Walter J. Morrow.
John H. Muenster.
Samuel A. Nielson.
Bert. Newsome.
James T. New.
John E. Nyman.
Charles H. Oakman.
Charles F. Palmer.
Albert J. Prescott.
James L. Palmer.
William A. Penn.
Franklin Pfeifler.
George T. Page.
John D. Purcell.
William C. Parsons.
Frank E. Phillips.
George S. Root
Dennis H. Rowells.
Fred E. Reynolds.
Charles B. Reynolds.
James A. Reynolds.
William W. Robbins.
Joseph H. Robinson.
Victor H. Rea.
Edgar M. Richards.
Robert H. Robertson.
Omro E. Severance.
Bertram G. Smith.
Ard P. Smith.
Fred. J. Staehle.
George M. Sutherland.
Sylvester E. Stouffer.
John F. Stephan.
James B. Stuck.
Jeffrey Springle.
C. O. W. Schycker.
Sebastian R. Salazar.
Paul Steinberg.
Arthur G. Tibbitts.
Richard E. Thexton.
Edgar F. Thomas.
Herbert H. Tyler.
Edward R. Victor.
Matthew Wilson.
Hans B. Wiborg.
James A. Welch.
Clarence W. Williams.
Charles A. Wedge.
Fred. H. Wallace.
Frank P. Welch.
William F. Whalen.
Louvain A. Werden.

HOWARD UNIVERSITY—DENTAL DEPARTMENT.

THE annual commencement exercises of the Dental Department of Howard University were held at the Congregational Church, Washington, D. C., on Wednesday evening, April 13, 1892.

The annual address was delivered by Professor D. S. Lamb.

The number of matriculates for the session was ten.

The degree of D.D.S. was conferred on the following graduates by Rev. J. Eames Rankin, D.D., LL.D., president of the board of trustees: Andrew Gwathney, Virginia; Albert S. Johnson, New York; and John McDonald, Prince Edward Island.

DENTAL SOCIETY ANNOUNCEMENTS.

AMERICAN DENTAL ASSOCIATION.—SPECIAL NOTICE.

THOSE intending to present papers to the different sections of the association at the meeting to be held at Niagara will aid materially in the work if they will have made duplicate type-written copies of their essays. The labor and responsibility imposed upon the secretary of the association by the demands of the various journals for abstracts has made this charge a necessity, and it is especially urged that this request be complied with in all cases.

Signed by order of the chairman of the Executive Committee.

C. N. PEIRCE, *Sec'y Ex. Com.*

AMERICAN MEDICAL ASSOCIATION.

THE annual meeting of the American Medical Association will be held in Detroit, Mich., June 7, 8, 9, 10, 1892.

The officers of the Section of Oral and Dental Surgery are Professor J. Taft, Cincinnati, chairman; Eugene S. Talbot, Chicago, secretary.

The following essayists and essays have been secured:

I. Dr. J. Taft.

II. Dr. H. Gradle, Chicago. "Experiences in Empyema of the Maxillary Sinus."

III. Dr. G. S. Junkerman, Cincinnati. "Oral Manifestations in Metallic Poisonings."

IV. Dr. John L. Gish, Jackson, Mich. "Diseases of the Gums."

V. Dr. T. D. Crothers, Hartford, Conn. "On Diseases of the Teeth and Jaws in Inebriates."

VI. Dr. J. Smith Dodge, New York. "The Local and General in Dental Pathology."

VII. Dr. G. Lenox Curtis, New York. "Restoration of Sight following Operation for Necrosis of the Sphenoid Bone."

VIII. Dr. W. C. Barrett, Buffalo, N. Y. "The Condition of the Dentine in Pulpless Teeth."

IX. Dr. M. H. Fletcher, Cincinnati. "A Universal Mento-Dental Splint, with Report of Case."

X. Dr. E. S. Talbot, Chicago. "Arrest of Development and Decalcification of the Enamel and Dentine."

XI. Dr. John S. Marshall, Chicago.

XII. Dr. G. W. Weld, New York. "The Treatment of Anæmia by a New Preparation of Iron, illustrated by the Hæmoglobinometer."

Others have signified their intention to write papers, and their subjects will be announced in the next number.

DENTAL SOCIETY OF THE STATE OF NEW YORK.

THE twenty-fourth annual meeting of the above society will be held in the Y. M. C. A. Building, Albany, N. Y., Wednesday and Thursday, May 11 and 12, 1892, convening promptly at 10 o'clock in the forenoon of the first day.

Essays to be read: "Dental Erosion and the Gouty Diathesis; are they Usually Associated?" Edwin T. Darby, D.D.S., Philadelphia.

"Treatment of Irregularities of the Teeth." Eugene S. Talbot, D.D.S., Chicago, Ill.

"The Herbst Method of Treating Exposed Pulps." C. F. W. Bödecker, D.D.S.

"Electricity: its Application in Dental Practice." Albert Carter Westlake, D.D.S., Elizabeth, N. J.

The following distinguished members of the profession will positively be in attendance, and will take part in the discussions: Drs. A. L. Northrop, S. G. Perry, Edward C. Kirk, Daniel N. McQuillen, John D. Thomas, R. B. Winder, M. W. Foster, L. D. Shepard, J. N. Farrar, V. H. Jackson, S. C. G. Watkins, L. Ashley Faught, W. C. Barrett, J. Bond Littig, C. E. Francis, R. R. Andrews, Wm. H. Dwinelle, Frank French, E. S. Gaylord, K. C. Gibson, C. N. Peirce, S. H. Guilford, F. H. Lee, B. F. Luckey, F. A. Levy, W. W. Allport, C. S. Stockton, Frank Abbott, E. A. Bogue, C. Heitzmann, W. G. A. Bonwill.

CHAS. S. BUTLER, *Secretary.*

TEXAS DENTAL ASSOCIATION.

THE twelfth annual meeting of the Texas Dental Association will convene at Fort Worth, Texas, the fourth Tuesday in May, 1892, and continue in session four days. The profession is cordially invited to be with us.

CHAS. B. LEWIS, *Secretary*, Ennis, Texas.

GEORGIA STATE DENTAL SOCIETY.

THE twenty-fourth annual meeting of the Georgia State Dental Society will be held at Rome, Ga., July 19, 20, 21, and 22, 1892.

L. D. CARPENTER, *Cor. Sec.*, Atlanta, Ga.

SOUTH CAROLINA STATE DENTAL ASSOCIATION.

THE twenty-second annual meeting of the South Carolina State Dental Association and of the State Board of Dental Examiners will be held at Rock Hill, S. C., commencing on Tuesday, July 12, 1892, at 10 A.M.

B. RUTLEDGE, *Secretary*, Florence, S. C.

MICHIGAN STATE DENTAL ASSOCIATION.

THE annual meeting of the Michigan State Dental Association will be held at Saginaw, June 2, 3, 4, 1892.

J. WARD HOUSE, *Sec'y*, Grand Rapids, Mich.

LEBANON VALLEY DENTAL ASSOCIATION.

THE seventeenth annual meeting of the Lebanon Valley Dental Association will be held at Ashland, Pa., on the 17th and 18th days of May, 1892.

A cordial invitation is extended to all dentists of that locality to be present.

C. R. SCHOLL, *Cor. Sec.*, Reading, Pa.

MARYLAND STATE DENTAL ASSOCIATION.

THE annual meeting of the Maryland State Dental Association will be held at Baltimore, Md., May 9, 10, and 11, 1892. The profession is cordially invited to attend.

F. F. DREW, *Cor. Sec.*,
701 N. Howard street, Baltimore, Md.

ILLINOIS STATE DENTAL SOCIETY.

THE twenty-eighth annual meeting of the Illinois State Dental Society will be held at Springfield, Ill., May 10 to 13, 1892. The State Board of Dental Examiners will meet at the same time and place. A cordial invitation is extended to the profession generally to be present.

LOUIS OTTOFY, *Secretary*,
70 Dearborn street, Chicago.

FLORIDA STATE DENTAL ASSOCIATION.

THE Florida State Dental Association will meet in the Yacht Club Hall, Jacksonville, on Tuesday, May 10, 1892. There will be a fine display of dental supplies and improvements.

The State Dental Board of Examiners and the State Committee of the World's Columbian Dental Congress will meet at the same time and place.

All dentists are cordially invited to attend.

J. N. JONES, D.D.S.,
Pres. Dental Board and Ch. State Com. World's Col. D. C.,
Jacksonville, Fla.

PENNSYLVANIA AND NEW JERSEY STATE DENTAL SOCIETIES.

THE above societies intend holding a joint meeting at Cresson Springs, Pa., beginning on Wednesday evening, July 20, 1892, and continuing for three days. It is designed to make this one of the most memorable dental meetings ever held in the Middle States.

The papers and essays will be read by men eminent in the profession, and the clinics will embrace every phase of prosthetic and mechanical dentistry.

Intending exhibitors are requested to notify the committee before May 10, stating the amount of space required and the class of exhibits. A small charge will be made to defray the expense of arranging for exhibits.

DR. D. N. MCQUILLEN,
1628 Chestnut street, Philadelphia, Pa.
DR. A. B. ABELL,
226 North 12th street, Philadelphia, Pa.
DR. C. W. F. HOLBROOK,
34 Park street, Newark, N. J.
DR. OSCAR ADELBERG,
Elizabeth, N. J.
} *Committee on Exhibits.*

EDITORIAL.

ANONYMOUS CRITICISM.

THE *Journal of the British Dental Association* publishes in its issue for January of this year, under the title "Comparative Dental Anatomy," a communication from a correspondent who signs himself "A. W.," which consists mainly of some quotations from the proceedings of the last meeting of the American Dental Association, having reference to the paper by Dr. A. H. Thompson on "The Dentition of the Felidæ," and the ensuing discussion thereon as published in the DENTAL COSMOS for October, 1891, page 856. The writer questions the accuracy of a number of statements there made, and indicates the, to him, doubtful points by italics.

The February issue of the journal in question publishes in a communication signed "Cis-Atlantic," bearing the same heading as the January communication, an offensively sarcastic specimen of mud-throwing at the literary and scientific work of American dental societies. The author characterizes the writings cited by "A. W." as "bosh" and "bunkum" (which, by the way, should be spelled buncombe), stating that the latter is a word that "comes from that side of the Atlantic whence proceeds by far the greater part of the kind of dental literature which has afforded amusement to or excited the amazement of 'A.W.'" This is prefaced by the general statement that "The game of playing at mock science still goes merrily on at numerous American dental societies, and if A. W. has enough spare time he may find from month to month plenty of reports of papers and debates upon them out of which it is impossible to extract many sentences of intelligible language."

Until the correspondent quoted develops sufficient courage to abandon his guerilla method of attack and adopt the name and attitude of a man in his literary warfare, his innominate character is a sufficient protection to him, and is perfectly consistent with one who has more "spare time" to read than of ability to "extract sentences of intelligible language" from what he reads of American dental society reports. We have therefore to deal not with him, but with the kind of dental journalism which permits such communications to appear. A disclaimer may and does properly relieve an editor or publisher from responsibility regarding statements which do not appertain to character or motive; but when views involving character or person, be they true or untrue, but having a detractive animus, are admitted,—especially when these are anonymously published,—the entire responsibility for the act rests upon the journal and its representatives. This much our esteemed contemporary should know, and it should be a sufficient warrant for consigning all such unsigned communications to the editorial waste-basket,—a course so generally adopted in all branches of journalism at present that it would seem superfluous in this latter part of the nineteenth century to call attention to it.

The kind of publication referred to, if persisted in, must involve consequences which in the name of professional aspiration and progress on both sides of the Atlantic we should deplore. Whatever in the minds of our British brethren may be the status of American dental practitioners as compared with themselves, we are loath to believe that the utterance cited in any degree represents their estimate. There exist, no doubt, honest differences of opinion which are fully recognized by both sides, and which careful and unprejudiced investigation must in time satisfactorily adjust. But a true spirit of professional harmony can never be established by the cowardly and unmanly method of anonymous criticism to which the dental journal in question has opened its pages,—a method as unworthy of an intelligent and civilized journalism as it is repugnant to the acknowledged British love of fairness. We suggest therefore that our esteemed contemporary can better enhance the value of its publication by exerting a fostering care over all tendencies looking to a harmonization of international relations in dental professional matters, than by abetting in the impotent vituperations of anonymous individuals whose highest motive is a desire to air their mental sores to the disgust of a more enlightened public.

With reference to the queries of "A. W.," the following communication from the author whose remarks were principally criticised is appended, in the hope that those interested may be able to "extract some sentences of intelligible language" from it:

To the Editor of the Dental Cosmos:

Sir,—The criticism made by an anonymous writer in the *Journal of the British Dental Association* on my allusion to the specialization of the horse's teeth and the reduction from forty-four, the typical number, to forty, calls for a short response, so that the writer, who it seems is too cowardly to append his own name to his articles, may know that the statement which he so unfairly assails is justified by one of the ablest of his own countrymen.

On pages 114–117 in "The Horse: a Study in Natural History," by William Henry Flower, C.B., LL.D., D.C.L., Sc.D., F.R.S., etc., he will find the following information: "The horse, though founded upon the same general type as the primitive Ungulates of the Eocene period, have undergone a remarkable amount of specialization, fitting them in an eminent degree for the purpose they have to fulfill. . . . As mentioned in the first chapter, all the early Ungulate mammals, without exception, had on each side, above and below, three incisors, one canine, four premolars, and three molars,—that is, eleven on each side above, and eleven below, or forty-four altogether. *The modern horse has nearly, if not quite, this full number.* The front teeth, or incisors, are the same,—six above and six below,—taking the two sides together. . . . The canines, or 'tushes,' are present, as a rule, only in the males.

The cheek-teeth or premolars and molars taken together (for there is very little to distinguish them in form or size), are generally but six, instead of seven, on each side above and below. Here, then, is a case of specialization by suppression. One of the teeth of the ancient forms has disappeared. Which is it? The examination of a series of fossil remains shows us that the first of the series—the anterior premolar, a fairly large and well-developed tooth in Phenacodus and Hyracotherium—gradually became smaller and smaller as time advanced. It is still present in Anchitherium, sometimes present and sometimes absent in Hipparion. But has it entirely disappeared in the modern horse? What do we read in old books on veterinary surgery? 'Wolves' teeth are two very small, supplementary teeth, appearing in front of the molar teeth, and supposed to have an injurious effect on the eyes, and are, therefore, often removed by farriers.'

"These little rudiments of teeth, about which such nonsense as the above has been written, are, when properly understood, of intense interest. Their diminutive size, their irregular form and inconstant presence, combined with their history in the extinct horse-like animals, show them to be teeth which, for some reason to us at present unknown, have become superfluous—have been very gradually and slowly (as in the case of all operations of the kind) dispensed with, and are, in the stage to which the horse has now arrived in his evolution, upon the point of disappearance. The presence of these so-called 'wolves' teeth' alone is sufficient, if we had no other proof, to show that the horse is not an isolated creation, but one link in a great chain of organic beings. The fact that these teeth are almost always met with in the upper jaw only, should be noted in connection with what has been previously mentioned respecting the dentition of the tapir. The first upper premolar is retained in that animal, while the corresponding lower tooth has entirely disappeared.

"It would be very interesting, if a sufficiently large number of specimens could be examined, to obtain some statistical information as to the relative frequency of the occurrence of these teeth in the different species of wild and different breeds of domestic horses. They are usually so loosely attached in the skull that they become lost in specimens prepared for museums; but indications can generally be seen on the bone, if they have been present."

C. N. Peirce.

BIBLIOGRAPHICAL.

Notes on Dental Practice. By Henry C. Quinby, L.D.S.I., Member of the Odontological Societies of London and New York; President elect of the British Dental Association. With illustrations. 1892. London, J. & H. Churchill; Liverpool, Gilbert G. Walmsley. 216 pp., with index.

In the preface of his work the author limits his field to the "treatment of abnormal conditions of the teeth," and his limitation is conspicuously noticeable, especially in the chapter on "Permanent Teeth." The remarks on chiseling away teeth to remove superficial decay or for the purpose of anticipating this malady, should have been accompanied by words of caution. The disk or chisel too frequently makes sad havoc when indiscriminately used. His comments on page 68, third chapter, on the causes of degeneracy of the teeth and jaws and of tooth-disintegration, are pointed and timely, and do much to redeem the book from some weaker features.

The views of the author on extraction as a means of preventing decay, enforced by cuts exaggerating the results of non-extraction, are not well sustained; there is too much assumed in ignoring all other factors which are instrumental in decalcifying tooth-structure.

The pages on "Irregularities" illustrate some neat and appropriate correcting appliances, but these are hardly up to the more modern methods, though doubtless in time they would accomplish the work for which they are designed.

The remaining chapters, on "Treatment of Adult Teeth," "Amalgam," and "Pivoting," contain nothing new. The advice given is generally conservative and such as has been found correct in practice; but after all the query involuntarily arises, Why has the author written the book? Is it to satisfy a laudable ambition for authorship, or from a love of his profession or of humanity, and a desire to render a service by presenting conclusions which he deems to be not otherwise attainable?

CATCHING'S COMPENDIUM OF PRACTICAL DENTISTRY FOR 1891. B. H. CATCHING, D.D.S., Editor and Publisher, Atlanta, Ga. Constitution Publishing Co., Atlanta, Ga., 1892.

The second issue of this valuable book exhibits a marked improvement over the first one. The thanks of the dental profession are due to the editor for the large amount of classified information which he has compiled from the current dental literature of the year, and which is thus rendered available for the busy practitioner or writer whose limited time will not permit a systematic reading of all the dental periodicals. The work of selection and condensation has been well and conscientiously performed, and the two hundred and forty-one pages contain much that will be valuable to all dental practitioners.

We hope for the continued publication of the Compendium as an acceptable yearly *résumé* of dental progress.

CHART OF TYPICAL FORMS OF CONSTITUTIONAL IRREGULARITIES OF THE TEETH. By EUGENE S. TALBOT, M.D., D.D.S. Published by the Wilmington Dental Manufacturing Co., Philadelphia, 1891.

This handsome set of sixteen colored lithographs is a contribution of distinct scientific value to the study of orthodontia. The author, by reason of his exhaustive studies in this branch of dental pathology, is eminently qualified to produce such a work, and the result fully justifies the expectation. Each typal aberration from the normal is fully delineated in different views, naturally colored, and leaves nothing to be desired in point of clearness. The careful work which is being done by the author in this line is aiding greatly to place the study of orthodontia upon a sound scientific basis, and the chart of typical forms of irregularity which he has given us will do much toward dissipating the confusion which seems to exist regarding the actual forms of irregularity to which well-known terms belong and which are frequently misapplied.

The chart is a valuable aid in self-instruction, or as an accompaniment to the study of the general subject of orthodontia.

OBITUARY.

DR. JOHN ALLEN.

Died, at Plainfield, N. J., March 8, 1892, from general debility, John Allen, D.D.S., in the eighty-second year of his age.

Dr. Allen was born on his father's farm in Broome county, N. Y., November 4, 1810. He was a descendant of the Ethan Allen family of Vermont, whose history is identified with the Revolutionary war. When a boy the family moved to Ohio, and at the age of nineteen Dr. Allen became a student of Dr. James Harris, a medical man of high standing, who relinquished the practice of medicine for that of dental surgery. After his course of pupilage he began his professional career in Cincinnati in 1830, and at the medical college of that city was accorded the privilege of prosecuting his studies on the characteristics and anatomy of human teeth.

Dr. Allen early sought and obtained a practical knowledge of the manufacture of mineral teeth. In order to overcome the defects of appearance and lack of strength and the stiff mechanical appearance of dentures made from single and block teeth, he instituted experiments with a view of working out a system of improvement in these respects. An important step was an effort to test the practicability of raising the sunken portion of the face in cases where the original form and expression were destroyed or changed by the loss of teeth, and the consequent absorption of the alveolar processes. The result of his efforts proved successful, and the American Society of Dental Surgeons awarded to him a gold medal for his contribution to science in an "invention for restoring the contour of the face," in August, 1843.

He next gave his attention to a process by which to overcome the defects that existed in plate-work. In the mean time, he had interested himself in procuring a new charter for the Ohio College of Dental Surgery, which was established in Cincinnati in 1845, and he was appointed to a professorship in that institution, which he held for some years, until his removal to New York, in 1853, in order to more conveniently prosecute his experiments in the improvement of prosthetic work.

Experiments had been made by M. Delabarre, of Paris, as early as 1820, in the form of denture that has come to be known as "continuous-gum work," but his results fell short of practical utility from the failure of his method to compensate for the contraction of the porcelain body, which produced distortion of the teeth and articulation as well as warping of the plate during the process of firing the piece. Dr. Allen instituted a line of experiments in this work extending over several years, and brought it to its present state of beauty and perfection, and the profession now acknowledges a lasting debt to him for these artistic productions. Appreciation of his work has been manifested by the award of medals from many American societies and institutes, and also from the World's Expositions at Paris in 1867 and 1878, at Vienna in 1873, and our Centennial in 1876.

Dr. Allen had the degree of D.D.S. conferred upon him by the Baltimore College of Dental Surgery. He was twice married,—first to Miss Dana, of Ohio, in 1835, and last to Miss Reeder, of Ohio, in 1846. One son, Dr. Charles D. Allen, by his first wife, and one daughter by his second wife, survive him.

MELVILLE M. JOHNSTON.

Died, April 2, 1892, at Los Angeles, Cal., Melville Morton Johnston, founder of the dental manufacturing firm of Johnston Bros., and one of the stockholders and active workers in The S. S. White Dental Manufacturing Company from its organization.

Mr. Johnston was the third son of John Johnston, LL.D., who was for forty years professor of chemistry in the Wesleyan University at Middletown, Conn., and author of various text-books on chemistry. He was born at Middletown, Conn., July 2, 1842, and graduated from the university in 1863, receiving the degree of B.A. and later of M.A. During the war of the rebellion he was actively engaged in superintending a manufactory of ammunition, a permanent lameness, resulting from an accident in childhood, having prevented his enlistment in the army.

In 1865 he engaged in the manufacture of dental goods under the firm name of M. M. Johnston & Co., afterward Johnston Bros., and by his intelligence and energy soon carried the house to a prominent position in the trade. The firm brought out successively the Morrison engine,—which was the first dental engine offered to the profession, and which may be said to have almost revolutionized dental practice,—the Morrison chair, cone-socket handles for instruments, and the Wilkerson chair, each of which was a great advance in its way, and with the advantages of which all dentists are familiar. This firm also introduced into this country the manufacture of nitrous oxide gas as a commercial article. It had previously been made in England on a small scale, but since its introduction here this branch of manufactures has grown into a business of great magnitude both at home and abroad.

Taking up the manufacture of dental gold foil, Mr. Johnston originated a peculiar chemical process of refining gold, by which the absolute purity of the product was assured, demonstrating his claim to the satisfaction of the officials of the United States Mint, at the New York Assay Office, in the face of their emphatic assertion in advance that while 1000 fine gold could be produced in small quantities, it was unknown in commercial quantities. Messrs. Johnston Bros. obtained an official certificate of the absolute purity of their gold, and the term "1000 fine" was adopted as the trade-mark for their dental gold foil.

The S. S. White Dental Manufacturing Company was organized July 1, 1881, out of the business of the late Dr. S. S. White and that of Johnston Brothers. Since that time until last fall Mr. Johnston was active in the business of the company, his time being devoted chiefly to the manufacture and perfection of its various gold preparations, and to him many of the advances made in the methods of manufacture and in the quality of the goods are to be credited.

Until within a year or two he enjoyed good health, and was an energetic worker. In the fall of 1890 he had an attack of typhoid fever, from which he never seemed to fully recover. About four months ago, on the advice of his physicians, and accompanied by his wife, he went to Southern California, in the hope that rest and change of climate would restore him to his usual condition of health and vigor. In this, however, there was a sad disappointment, as after a brief period of apparent improvement he failed rapidly, and finally passed away as above stated.

He was married October 27, 1871, to Miss Ellen M. Wheeler, of Zanesville, O., and their married life was a very happy one. He leaves three children: a son, just entering manhood, and twin daughters.

He was a man of education and culture, of refined tastes and purity of character. His inclination was toward the practical, and in whatever he undertook to do he was painstaking and thorough. He had a bright, cheerful, social disposition, made many friends, and was self-denying and helpful in times of need. He had deep religious convictions, and took an active part in church work. In the prosecution of his business he made the acquaintance of a large number of the leading members of the dental profession, among whom are many warm friends who will learn with regret of his comparatively early decease.

DR. D. HAYES AGNEW.

Dr. D. Hayes Agnew died at his home, No. 1601 Walnut street, Philadelphia, at twenty minutes to 3 o'clock, on March 22, 1892

He was born in 1818, in Lancaster county, where his father was an eminent physician. His classical education commenced in the Moscow Academy, a flourishing institute then under the supervision of the Rev. Francis Latta, and located in Chester county. He next studied at Jefferson College, Cannonsburg, Pa., and finally completed his education at Newark College, Delaware.

His medical training was obtained at the University of Pennsylvania, from which he graduated in the class of 1838, and entered upon the practice of his profession in the rural districts. After some years he removed to Philadelphia, where he continued his practice and commenced to deliver a course of lectures in the Philadelphia School of Anatomy.

At the outset he selected operative surgery as his specialty, and in connection with the School of Anatomy founded classes in that branch. He also established the Philadelphia School of Operative Surgery. Within it he chose no special line, but for operations of all descriptions was considered a master hand.

Dr. Agnew quickly came to be regarded as a promising man, and in 1854 he was appointed one of the surgeons of the Philadelphia Hospital, and there a permanent memorial of his services remains in the pathological museum, which he founded and of which he was the first curator. In 1863 he was appointed demonstrator of anatomy and assistant lecturer in clinical surgery in the medical department of the University of Pennsylvania, and about the same time was chosen one of the surgeons of Wills Ophthalmic Hospital.

In 1865 he was chosen surgeon of the Pennsylvania Hospital, where he was the colleague of Drs. Hunt, Morton, and Levis. In the same year he was made surgeon of the Orthopedic Hospital. In 1870 he was chosen to fill the chair of operative surgery in the University, and in 1871 that of the principles and practice of surgery. He was also professor of clinical surgery in the University Hospital.

A most valuable experience to him was his service as consulting surgeon in the great Mower Army Hospital, which was maintained at Chestnut Hill during the war. It was the largest hospital in the country, and was under the care of Dr. Joseph Hopkinson and forty-seven physicians as a resident staff, while Drs. Agnew and Morton alternated as consulting surgeons. In this capacity all the most dangerous cases came under their notice, and all the most trying operations fell to their hands. A very large proportion of gunshot wounds was always, of course, among the cases, and at one time the number of these reached five thousand.

Dr. Agnew was one of the consulting surgeons called in to attend President Garfield, and his skillful hand twice brought relief when unfavorable symptoms appeared to be gaining the upper hand. When Dr. Bliss handed the knife to Dr. Agnew and invited him to perform the first operation, he drew to him the eyes of the entire country. The act was entirely complimentary in character, but it was recognized as peculiarly appropriate by professional men, and drew public attention more strongly than ever to the honorable career which called for such a recognition.

He contributed no great discovery to science, nor was he the author of any remarkable invention, and no great operation stands inseparably connected with his name ; but his writings, wherein the results of his wide reading and varied experience are combined, are regarded as high authority. Besides this, he bore a high reputation as a lecturer, and was accounted one of the most rapid, efficient, accurate operators and one of the keenest and most reliable consulting surgeons in this country.

He was a thoroughly conservative surgeon, but ready for any emergency, and was, above all things, thoroughly practical. This practical quality seemed to run through all his work,—as an operator, as a teacher, and as a writer ; it is the leading characteristic of the valuable treatise on operative surgery which he published.

Among his other contributions to the literature of the profession are a work on "Practical Anatomy," a series of papers (sixty in number) on "Anatomy in its Relations to Medicine and Surgery," and numerous contributions to medical journals on various subjects connected with surgery.

He always bore a reputation for great modesty and a high sense of professional duty. In private life he was as highly regarded as professionally. He was a member of the Presbyterian Church, and many years ago was married to Miss Irwin, a member of the well-known Chester county family of that name. He had a large and lucrative private practice, and some time ago gave up his active connection with the University of Pennsylvania, although retaining the position of honorary professor of clinical surgery.

DR. GEORGE M. SPANGLER.

Died, in Denver, Col., February 26, 1892, George M. Spangler, D.D.S., in the twenty-fifth year of his age.

Dr. Spangler was born in Allegheny City, Pa., June 1, 1867. After his education in the public schools, he was employed in a jewelry store for four years; but at the age of twenty began the study of dentistry with Dr. Scott, of Pittsburg, with whom he stayed two years. He then matriculated at the Philadelphia Dental College, and graduated from that institution in the class of 1891. After graduation he began his professional labors in his native city, and was only a short time in building up a fine practice. He was a skillful operator, and was personally held in high esteem.

Dr. Spangler's mother dying when he was but a boy, left him a counsellor and friend to his father and to several other children, and he was ever faithful in brotherly love and care for them. He was a member of the First Christian Church of Allegheny, and was popular with the young people of the church because of his labors in their behalf. On account of failing health he went to Colorado only a few weeks before his death, but failed to receive the benefit expected, and soon passed away.

DR. CHARLES A. KINGSBURY.

At the monthly meeting of the American Academy of Dental Science held in Boston, March 2, 1892, the following resolutions were adopted:

"Whereas, Charles A. Kingsbury, M.D., D.D.S., late of Philadelphia, an associate member of the American Academy of Dental Science, has recently been called away from these earthly scenes into the higher existence beyond the grave, we, his fellow-members, would offer the following resolutions of respect to his memory:

"*Resolved*, That the Academy has received with sincere sorrow the intelligence of the decease of our highly esteemed friend and associate;

"*Resolved*, That in the death of Dr. Kingsbury the profession has lost one of its brightest and most honored members, and the city and community in which he lived one of its most exemplary and useful citizens;

"*Resolved*, That we tender our sympathy and condolence to his surviving family; that the corresponding secretary be requested to forward a copy of these resolutions to them, that they be entered upon the records of the Academy, and published in the dental journals."

C. A. Brackett, D.M.D., *President.*
E. N. Harris, D.D.S., *Corresponding Secretary.*

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PERISCOPE

Hydrogen Dioxide.—The use of peroxide of hydrogen has, during recent times, become greatly extended not only in the arts, but also in medical and surgical practice. Aside from the presence or absence of foreign substances, such as acids, barium salts, etc., the value of the commercial article depends upon the quantity of absolute hydrogen dioxide (H_2O_2) it contains, or, in other words, upon the quantity of available oxygen (H_2O+O) obtainable from it.

Ever since peroxide of hydrogen has appeared on the market as a commercial product, its strength has been stated by such terms as "10 volumes," "15 volumes," etc., which were intended to mean that 1 volume of the commercial solution would yield, upon decomposition of the absolute hydrogen dioxide (H_2O_2) it contained, 10 volumes or 15 volumes, etc., of oxygen gas. This form of statement may have been very convenient for certain technical purposes, but is unscientific and indefinite, inasmuch as the proportion of the volume of the gaseous oxygen to the liquid solution of peroxide of hydrogen varies greatly with the temperature. Nevertheless, the supposed indication of "volume" is the criterion of the commercial value of the peroxide even at the present time.

We have said "supposed indication" designedly, because we know of no brand of peroxide of hydrogen of the market which actually comes up to the volume strength claimed for it. It is known to us that special lots have been made, upon special demand, which were of the full strength claimed, but aside from these we have reason to know that the commercial volume indication is fallacious, as will be seen farther on.

Valuation of Hydrogen Dioxide.—The best method of determining the strength of a solution of hydrogen dioxide is titration with permanganate of potassium.

The reaction taking place is as follows:

$$\underset{\substack{\text{hydrogen}\\\text{dioxide}\\(170)}}{5H_2O_2} + \underset{\substack{\text{potassium}\\\text{permang.}\\(316)}}{2KMnO_4} + \underset{\substack{\text{sulphuric}\\\text{acid}\\(294)}}{3H_2SO_4} =$$

$$= \underset{\substack{\text{potass.}\\\text{sulphate}\\(174)}}{K_2SO_4} + \underset{\substack{\text{manganese}\\\text{sulphate}\\(302)}}{2MnSO_4} + \underset{\substack{\text{water}\\(144)}}{8H_2O} + \underset{\substack{\text{oxygen}\\(160)}}{10O}$$

The strength of the permanganate solution used for titration is decinormal, containing 3.16 gm. in the liter ($KMnO_4 = 316$).

Commercial peroxide of hydrogen solution scarcely ever contains over three per cent. by weight of absolute hydrogen dioxide.

The test is made in the following manner:

Carefully measure 10 cc. of the peroxide into a graduated cylinder, and add enough distilled water to make 100 cc. Of this liquid transfer 10 cc. to a beaker, add to it 15 cc. of diluted sulphuric acid, and then, from a burette, decinormal permanganate solution until the color of the latter is no longer discharged and the liquid shows a faintly pink tint.

If the operation is conducted at the ordinary indoor temperature, the results are practically accurate enough and no correction need be made. It is, however, advisable to make the test at a temperature not greatly exceeding 60° F.

As the solution of the peroxide has, practically, the same specific gravity as water, it is assumed that 1 cc. of it is equal to 1 gm. Further, the liter of oxygen gas is taken as weighing 1.43 gm.

Every 34 parts of hydrogen dioxide (H_2O_2; mol. weight 34) yield 16 parts of free oxygen. And every cubic centimeter of the decinormal permanganate solution corresponds to 0.0017 gm. of hydrogen dioxide, or to 0.0008 gm. of oxygen gas. (See the reaction given above, where it will be noticed that only *half* of the oxygen liberated by the permanganate is derived from the H_2O_2.)

Assuming that 19 cc. of the permanganate solution have been consumed in making the test, then the 10 cc. of the diluted peroxide, representing 1 cc. of the original solution, contain $19 \times 0.0017 = 0.0323$ gm. of absolute hydrogen dioxide, or yield $19 \times 0.0008 = 0.0152$ gm. of oxygen gas.

Now, since 1000 cc. of oxygen gas weigh 1.43 gm., a simple calculation will show that the 0.0152 gm. of oxygen will measure 10.6 cc. Consequently, the original solution yielded 10.6 times its own volume of oxygen,—that is, it is 0.6 over "10 volumes."

Since each cubic centimeter of decinormal permanganate solution is equivalent to 0.0008 gm. of oxygen, and the latter measures 0.5594 cc. [$1.43 : 1000 = 0.0008\ x;\ x = 0.5594$], it follows that the figure 0.5594 may be used as a *modulus* for directly calculating the volume strength from the amount of permanganate consumed:

$$\text{Cc. of permanganate} \times 0.5594 = \text{volume strength of the peroxide.}$$

A true 10-volume peroxide, therefore, consumes 17.8 cc. of permanganate. A true 16-volume solution requires 28.6 cc., etc.

We believe it would be more rational and simple to express the strength of peroxide of hydrogen, not by the volumes of oxygen obtainable from 1 volume of the former, but by the number of cubic centimeters of decinormal permanganate (of correct titre) required for its decomposition. Then a 15-volume peroxide would in reality consume just 15 cc. of the permanganate, instead of requiring, as under the present method of stating the strength, 26.8 cc.—*American Druggist.*

Cancrum Oris.—In the *Lancet* of May 4, 1891, the author, in conjunction with Dr. Gates, reported three cases of cancrum oris successfully treated by the local application of corrosive sublimate. The author places on record a fourth case, in which the treatment proved unsuccessful.

The child, a boy, aged four years, was admitted, suffering from proptosis of the right eye and intense swelling of the cheek and eyelids on the same side. The child had been suffering for three weeks from swelling of the cheek, ulceration inside of the mouth, and free salivation. The boy had always been in excellent health.

On admission the child was not depressed and did not seem to be in pain. There was some necrosis of the jaw where the molars had been extracted. The necrosed bone was removed, pus evacuated, and the eye, being hopelessly diseased, was removed.

The next day the temperature was 102°; but the child was bright, and took his food well.

On the second day a gangrenous patch appeared at the outer canthus. On the following day gangrene was noticed in the center of the lower eyelid. The drainage-tube was removed and the orbital cavity well swabbed out with perchloride of mercury, 1-500, containing some glycerin and lint, soaked in the same, used as a dressing.

The gangrene now extended with frightful rapidity, notwithstanding that the parts were kept constantly soaked with the lotion, and that the strength of this was increased to 1-200.

The patient did not suffer any pain, and permitted the removal of dressings and sloughs without resistance. As the mercury was having no good effect, a lotion of chloride of zinc (eighty grains to one ounce) was used instead.

He died on the eighth day after admission. The whole of the right side of the face had disappeared, the cavity extending from just in front of the ear to beyond the bridge of the nose, and from the upper margin of the orbit to half an inch below the angle of the mouth, the commissure of the lips, however, being left intact. The floor of this cavity opened into the nose and mouth. Most of the superior maxilla had disappeared, and the inferior was partially exposed.

Remarks.—This case originated probably as an ulcerative stomatitis, followed by necrosis of the upper jaw, and typical nomatous gangrene.

No signs of the latter were present till thirty-six hours after the operation. The mercurial treatment had no effect whatever in checking the disease, although in three other cases in which the author tried it, its effect had been most marked within twelve hours.

This may be accounted for by the fact that the deeper structures were already thoroughly permeated by the virus, whatever it may be.

The author doubts if fuming nitric acid could have been adequately used, and is sure that the actual cautery could not, because of the large surface of bare bone in the original cavity. The case is remarkable, in that there had been no previous debilitating disease, and the boy was apparently in very good health. Constitutional symptoms, except rise of temperature, were absent till within thirty-six hours of death, when diarrhea set in.—*Archives of Pediatrics; epitome of paper by E. C. Kingsford, in the Lancet.*

Inorganic Substances (especially Lime) in the Bones of Normal and Rachitic Children.—H. Brubacher has made a large number of analyses under Voit's direction (*Zeitsch. f. Biol.*, xvii, p. 517, and *Centralb. f. d. med. Wissensch.*, No. 40, October, 1891), and he finds that in the human skeleton—as in that of the dog—with increasing age the bones become poorer in water (72 to 45 per cent.) and richer in ash (11 to 28 per cent.). The total amount of water in all the soft parts decreases with the growth of the individual (for example, muscle from 84 to 77 per cent., and the intestines from 87 to 76 per cent.), and also the amount of ash in dry, fat-free organs. The spongiosa of bone and cartilage behave like the soft parts. The whole body during development contains absolutely more inorganic constituents, the increase of the ash of bones during growth more than compensates for the diminution in the organic constituents of the soft parts. In six rachitic children the bones contained much water (to 76 per cent.) and little ash (minimum 8.4 per cent.). The earthy phosphates, especially those of lime, are present in very much smaller amount than in normal bones. The diminution of bone-salts or bone-ash is greatest in the long tubular bones, less in the ribs, and least in the bones of the skull, obviously varying with the intensity of the disease in the different bones of the same individual. The soft parts contain more water than those of normal bone, and are usually also less fatty. The inorganic constituents of muscles are usually greater in amount, while in the liver they are present in about the same amount as in the normal child used for comparison. From this it follows that there are several causes leading to the diminished laying up of lime-salts in the bones. If the food contains too little lime-salts, the bones also contain much below normal, as shown by Voit in dogs. In the ordinary form of rickets in children the disease seems to depend on a condition of the osseous tissue which renders the assimilation of lime-salts by this tissue much more difficult. Enough lime is absorbed, but the articular cartilage has lost to a greater or less extent the faculty of taking up the most of the lime, and hence the soft parts in these cases contain a larger percentage of ash and lime-salts.—*Brit. Med. Journal.*

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HINTS AND QUERIES.

Restoration of Fractured Crown.—If the following case proves of interest, it must be mainly so from the rarity of the occurrence, rather than from any operative steps that were undertaken to restore the injured organ to its former appearance and to a measure of its former utility.

On the morning of the 29th of January I was consulted by Master G. W. S——, æt.——, who gave every indication of acute suffering, as well as of considerable nervous excitement. At school he had violently collided with one of his companions, the result being that the left upper central incisor was snapped off, about one-third of the crown remaining *in situ.* Such a loss at any time must be considered as serious, and doubly so in a mouth where development is still in progress; and if aggravation were required, it was furnished in the incisors being unusually prominent, a feature well developed in other members of his family. My first inquiries were as to what had become of the detached incisive portion, which fortunately the patient had had the presence of mind to recover and bring with him, and a glance sufficed to show that the line of fracture was a clean one. I then turned attention to the mouth, and found, on carefully removing the blood, that the broken surface there corresponded to the part now in my possession. The pulp was, as may be expected, fully exposed, and protruding from the opened cavity, while there was slight pain on gentle pressure, due doubtless to the shock that the tooth had received from the violent contact. The only misgiving that suggested itself was as to the condition of the root, more especially as to its complete formation at the apex; but observing that the other members of the series were well advanced in their formation, I concluded that I would not have much trouble in this direction, a surmise that happily proved an accurate one. I now anesthetized the patient with nitrous oxide, and with a Gates-Glidden drill carefully reamed out the pulp-cavity, clearing the chamber with a barbed nerve-broach, and douching with corrosive sublimate (1 in 1000). When possible, I give this immediate method the preference where pulp-destruction is contemplated, finding it on the whole more reliable than arsenious acid, or any escharotic that I have used, and the ultimate results are, I think, more favorable, as pericemental complications are to all intents and purposes excluded. I then introduced a dressing of chloride of zinc for the purpose of mummifying the dentinal fibrils, and dismissed the patient till the afternoon.

In his absence, the detached portion, which had been kept moistened in a carbolic acid solution, had a groove or gutter (*a*, Fig. 1) cut in the dentine to as great a depth as was thought safe, and into this was fitted a gold T-piece (Fig. 2), the stalk (*a*) being formed of "pivot" wire, and the head (*b*) soldered to it.

FIG. 1.

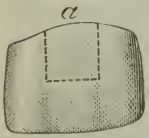


FIG. 2.

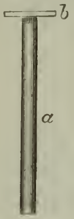
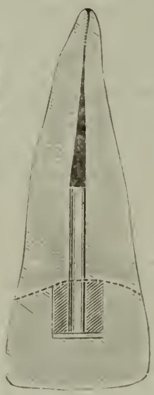


FIG. 3.



At 4 P.M. the patient returned, and on renewing the dressing it was noticed that practically no oozing had taken place, while sensibility on pressure had disappeared. The apex was then closed with a gutta-percha point moistened in chloro-percha, dusted with iodoform, and the canal slowly enlarged with a set of graduated drills. The fractured part being now tried in its original situation, the adjustment was found to be as perfect as had been anticipated; a little Richardson's crown-setting was then mixed to the consistency of cream, the T-piece first cemented into the broken fragment, and that again with its gold stalk finally adjusted to its normal situation (Fig. 3). What the ultimate result may be, it is of course beyond power to predict, but of the immediate effects one may speak with a little more confidence, and while close and minute inspection reveals a well-defined crack or mark at the seat of junction, this is not apparent when the patient is removed to the distance at which ordinary conversation takes place.—OSWALD FERGUS, D.D.S., L.D.S., Glasgow, Scotland.

TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—The February editorial, entitled "Morsal," I have read. It impressed me harshly at first, but to test its application I put it in practice in writing out the result of an examination as follows: Commencing on the right superior side. Third molar defective on morsal surface; second molar on distal and disto-morsal surface, deep decay but not involving pulp; first molar from the distal cervical line involving disto-morsal, morsal, and mesio-morsal to cervical border on mesial surface, with penetrating decay on both palatine and buccal surfaces; bicuspids both with deep lines of decay from mesial to distal surfaces across the morsal; while the cuspids had labial decay encroaching on morsal line, and the central and lateral incisors had deep congenital defects involving enamel on morsal surface. The teeth on the left side not varying in their defects, save the first molar had large palato-morsal decay, and second molar bucco-morsal involving much of the crown. In the inferior row linguo-morsal and morsal decay was prominent on the first and second molars.

I rather like the term.—C. N. PEIRCE.

To the Editor of the Dental Cosmos:

Sir,—I would like to place before your readers my method of preparing a root-canal for the reception of, and the manner of setting a Logan crown.

When a root-canal is nearly or quite straight,—take a superior incisor for example,—and all drilling is done, and the canal thoroughly cleared of all *débris* and well rinsed by syringing, insert in the hand-piece of the engine a small-sized Gates-Glidden drill, on which, while it is being revolved, wind a small quantity of well rumpled Japanese bibulous paper, and insert this into the root-canal while yet in motion. Then, after a few revolutions, remove it gently, reverse your engine to facilitate the removal of the paper swab, which for this purpose should be grasped between the thumb and index-finger of the left hand. Repeat this process until the canal is thoroughly dried; then, if it is a pulpless root that has become infected through putrefactive processes, dip the last swab used into and apply antiseptics, disinfectants, or germicides by the same means until complete sterility is accomplished.

The Japanese bibulous paper is preferable to cotton for this purpose for several reasons, the principal one being its easy manipulation and removal from the instrument.

Now, presuming that the crown has been previously completed and nicely fitted to the root and everything is ready, again insert the last drill used to clear away every particle of *débris* that may have become crowded into the apical foramen. Then plug the apical foramen with tin or gold foil, and having mixed the cement to a thick, creamy consistency, apply some to the root-canal by means of the swab and engine. This will completely smear every part of the canal and effectually prevent the loosening of the crown, and thoroughly preserve the tooth. Now, having smeared plenty of the cement on the crown-pin, place it and firmly press it home.

It takes but little practice to become expert in this method, and as it saves about three-fourths of the time consumed by pursuing other methods it is surely worth trying. I have been employing this method for about four years, and feel that I could not well get on without it.—M. O. Perkins, Galveston, Texas.

To the Editor of the Dental Cosmos:

Sir,—The following hint will, I feel sure, be acceptable to many, if not new to some:

Not long ago I had a lady call upon me to see if it were possible to have a very frail superior lateral incisor filled with gold. Others had tried and failed, and pronounced it an impossible operation. This stimulated me to put forth every effort to accomplish the task, and in the study of the case the thought came to me that as the tooth was frail and far from being firmly set, it should be supported during the entire operation, and I finally hit upon the following plan: I punched five holes in the rubber-dam, slipped it over five teeth,—my frail one and two on either side of it. I next warmed some modelling composition, and placed it back of the five teeth, pressing it firmly against and around them except where I had to fill. This furnished an excellent backing, and when hard held the teeth as if they were in the grasp of a vise.

There were two large cavities, one on each side of the tooth, extending well round onto the lingual surface. I excavated and proceeded to fill, and found that the composition served to keep the gold from pushing back, and enabled me to fill the lingual surface with ease. "In union there is strength," and the patient realized this fact, for instead of pounding away on one weak tooth its neighbors shared the strain. The patient suffered no pain whatever, and I was enabled to produce two fine solid fillings.—G. A. Stiles, Boston, Mass.

A New Use for Chloride of Ethyl.—This consists in directing the freezing jet upon the impression-cup during the taking of an impression, and thus hardening the modelling composition while it is still in the mouth.

It is evident that by this means any change of shape is prevented, and that the impression can be drawn from the mouth absolutely clean and perfect, even to the minutest details. A single trial will convince one of the utility of the method.—Gebrüder Gesell, Berlin. (Translation from *Le Progrès Dentaire*, February, 1892.)

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

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LIST OF UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING MARCH, 1892.

March 1.—No. 469,670, to T. H. Aldrich. Blowpipe.
" " No. 469,884, to W. S. How. Dental heater.
March 8.—No. 470,184, to Edward Ebi. Dental plugger.
" " No. 470,211, to R. F. Phillips. Mouth-mirror.
" " No. 470,332, to Chas. E. Friel. Artificial tooth.
March 15.—No. 470,670, to S. F. Gilmore. Disk-mandrel.
March 22.—No. 471,146, to Chas. P. Shultz. Dental engine.
March 29.—No. 471,877, to A. C. Miller and G. F. Wells. Dental engine.
" " No. 471,887, to E. E. Park. Disk-holder.
" " No. 472,004, to D. F. Sweet and J. B. Parker. Dental tool.

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ORIGINAL COMMUNICATIONS.

A STUDY OF THE DEGENERACY OF THE JAWS OF THE HUMAN RACE.

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(Continued from page 357.)

CHANGES OF STRUCTURE DUE TO CHANGE OF CLIMATE AND SOIL.

IN crossing between different races, says Quatrefages, the half-breeds possess the character that in each of them predominates over the corresponding characters of the other. Races of men most diverse in physical organization, such as blacks and whites, do not amalgamate perfectly, but obey the laws of hybridity.*

M. Jacquinot lays down the following conclusions on hybridity:† It is impossible, no matter how we produce crosses between species or races in the globe, to obtain a product which represents exactly one of the primitive types; that is to say, we shall never be able to construct with all the pieces a Negro, an American Indian, a German, or a Celt. Species will separate from primitive types and will become the more altered by crosses with other species, in proportion as the individuals which compose it differ from one another and the types are more numerous. Mulattoes are more degenerated than either negroes or whites, except in intelligence, in which they are intermediate.

The hybrids present in the average a mixture of the physical and mental character of the parents.‡ Gallesio§ impregnated an orange with pollen from a lemon, and the fruit borne on the mother-tree had a raised stripe of peel like that of a lemon both in color and taste, but the pulp was like that of an orange.

It is well known that plants undergo metamorphoses when transferred from one soil to another. Human races also change when transported from one country to another. In the United States, the Irish immigrant loses his Celtic aspect and becomes Americanized. This is also true of the Germans. There is no escape from the conclusion that physical and social conditions have here great modification of functions and structure, which offspring have inherited and increased.*

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* Nott and Gliddon.

† Ibid.

‡ Vogt, "Lectures on Man."

§ Darwin.

I have in many instances observed in the case of individuals whose complexion and general appearance have been modified by residence in a hot climate, that children born to them subsequently to such residence have resembled them rather in their acquired than primary mien.†

Sageret and Naudin found that the cucumber could not be crossed with any other species of the genus ; yet we hear from Naudin ("Flore des Serres") that there is a race of melons in which the fruit is so like that of the cucumber, both externally and internally, that it is hardly possible to distinguish the one from the other except by the leaves.‡

From the effects of crossing and variation, Mr. Rivers enthusiastically anticipates that the day will come when all our roses, even moss roses, will have evergreen foliage, brilliant and fragrant flowers, and the habit of blooming from June till November.§ The effect of climate upon the organisms has been written about to a great extent, and opinions are widely different. That it modifies vegetable life has been shown. Hemlock is said not to yield conicine when planted in Scotland. The root of Aconitum napellus becomes innocuous when planted in a frigid climate. Laurus sassafras in Europe loses the odor proper to it in North America. Annual plants sometimes become perennial when changed to a new climate.|| The tobacco-plant changes its form and a different grade of tobacco is produced when transplanted from North Carolina to Wisconsin.

Wheat quickly assumes new habits of life.¶ The peach has become hardier since it was known two thousand years ago. The blotched varieties of heartsease do not acquire their proper character until hot weather sets in, while other varieties lose their beautiful marks as soon as this occurs. The nature of the season has an especial influence on certain varieties of dahlias. The variegated strawberry loses its character when transferred from a dryish soil to a fresh and humid one. Dryness seems generally to produce hairiness of plants.** The Egyptian goose first laid its eggs in December when brought to France in 1801. In 1844, the eggs were laid in February; in 1845, in March ; in 1846, in April, the time when our common goose lays. French vines, when moved to the island of Bourbon, yield constantly, and silk-worms have acted in a similar manner ; they have laid their eggs and spun their cocoons with perfect indifference to the season of the year.†† When the new conditions of existence have differed too widely from old ones, local races have been formed, and thus, though perhaps assisted by human industry, pigs with fleece are to be found on the cold plateaus of the Cordilleras, sheep with hair in the warm valley of the Madeline, and hairless cattle in the burning plains of Magenta.‡‡

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* Herbert Spencer, "Principles of Biology."

† Dr. Brown, in Cyclopædia of Practical Medicine.

‡ Darwin.

§ Ibid.

|| Ibid.

¶ Ibid.

** Ibid.

†† De Quatrefages.

‡‡ Ibid.

Climate modifies the form of dogs. Several English breeds cannot live in India, and when bred there degenerate physically and mentally. Muzzles of bull-dogs become finer, and they lose their underhung character. Horses become reduced in size and attenuated in appearance when living on mountains, probably due to want of nutrition. Puni ponies are different from their Spanish progenitors.* Great heat decreases growth of fleece of sheep, as those imported into the West Indies and Africa. On the other hand, many wool-bearing sheep live on the hot plains of India. If they are sheared at a proper time, all goes well; but if not, the wool detaches itself in flakes, and short hair like that of a goat is produced.† In case of animals there are grounds for believing that cold and damp affect the growth of the hair.

It is a well-known fact that a change of climate and soil effects perhaps almost as great a change in the constitution as would result from an infusion of fresh blood.‡ Galls are of different colors, some having one face as rosy as the rosiest apple. This difference is due to the light. The apples of Nova Scotia are brighter-colored than English apples.§

The view that a change of soil is beneficial both to plants and animals under domestication has been maintained from the time of Columella, who wrote after the Christian era.

The "pelones" oxen of South America, a variety of ox having rare and fine hair, are adapted to a particular climate. In hot countries a variety is sometimes produced without any hair. The goat in South America has become more agile and of slighter build, with better-formed head and smaller horns than in Europe.||

Creole pullets whose ancestors have lived for ages in a hot climate have chickens nearly naked, or without down, and this is the case till feathers grow. Chickens of newly-imported breeds are covered with down.¶

The steatopyga of certain sheep in Central Asia disappeared in a few generations when removed from their native country. The Niata cattle serve to illustrate the extent to which modifications of the head can take place. This ox exhibits the modifications of the specific characters similar to those which the bull-dog presents among dogs. This race is already represented in the New World by two sub-races, one of which, that of Buenos Ayres, has preserved the horns, while that of Mexico has lost them.** A codfish called the bull-dog codfish produces a similar deformity.††

Cattle have been produced in Paraguay without horns, and having reversed hair.‡‡ The Thibet mastiff and goat, when brought down from the Himalayas to Kashmir, lose their fine wool.§§ Karabool sheep lose their peculiar black curled fleeces when removed into any other country.|||| In Angora, not only goats but shepherd dogs and cats have fine fleecy hair, due to the severe winter for its thickness and to the hot summer for its silky luster.¶¶ It has been asserted on

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* Darwin and Tylor.

† Ibid.

‡ Mr. Carr.

§ Darwin and Tylor.

|| Pritchard.

¶ M. Ronlin.

** De Quatrefages and Professor Owen.

†† Dr. Wyman.

‡‡ Darwin.

§§ Dr. Falconer.

|||| M. Burnes, "Travel in Bokhara."

¶¶ Mr. Ainsworth.

good authority that horses kept during several years in the deep coal-mines of Belgium become covered with velvety hair, almost like that on a mole.[*] It is claimed that the dogs of the New World have larger, flatter feet than those of the Old World, owing, no doubt, to running on snow.[†]

The *Pulex penetrans* is able to distinguish the white man fresh from Europe from a white man born there.[‡] The domestic cats which have been bred in Paraguay for three hundred years differ from European cats in being smaller by one-fourth, are more lanky, the hair is soft, shiny, scanty, and lies close, especially on the tail.[§] In another part of South America the introduced cat has lost the power of uttering its nocturnal howl.[||] On the opposite coast of Africa from Guinea the cats are covered with short, stiff hair. Throughout the Malayan archipelago the cats have truncated tails, often with a sort of knot at the end.[¶] In China a breed has developed without ears.[**]

Humidity of atmosphere, as in the region east of the Bay of Bengal, decreases the stature of horses. In Japan they reacquire their size.[††]

The effect of climate upon the human race has been discussed by quite a number of writers, and their conclusions have been variable.[‡‡] The American people are semi-nomadic. Thus the effects of disharmony of climate cannot but act in a depressing manner upon the general system, impairing nutrition and development, and influencing the teeth in a greater or less degree.

Trustworthy travelers, as d'Abbadie, give accounts of countries where the negroes and whites live side by side. In Abyssinia, where they have long lived in contact and intermingled, the Negro type is no longer characterized by either color, features, or hair, but simply by the exaggerated protuberance of the heel. This character in its turn, however, loses its value on the eastern coast of Africa, where the whole Negro tribes have the heel formed like ours.[§§]

Quechu Indians on the lofty plateaus of Peru, from breathing continually a highly rarefied atmosphere, have acquired chests and lungs of extraordinary dimensions. The air-cells are much larger and more numerous. The Agmara, an allied race, carefully measured by Forbes, living at a height of ten thousand to fifteen thousand feet, have relatively shorter limbs and longer trunks. The femur is shorter than the tibia, the humerus than the forearm,—probably a case of compensation. They present other singular points of structure, as a very small projection of the heel. An examination was made of a few pure families descended two generations from those who had been carried to the low eastern plains, and the characteristic peculiarities are still inherited, but in a less marked degree.[||||] People of the Andes have larger chests and lungs, due to the rarefied air.[¶¶] It is undisputed that presence of lime in the water affects the stature. More conscripts are rejected in Paris in soft-water districts on account of imperfect development and stunted growth, and in soft-water towns the mortality is greater.[***]

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[*] Darwin.

[†] Sir James Richardson.

[‡] Humboldt.

[§] Raengger.

[||] Ronlin.

[¶] "Voyage of the Beagle."

[**] Darwin.

[††] "Quadrupedes du Paraguay."

[‡‡] Thompson, "Hornology of Dental Tissue."

[§§] De Quatrefages.

[||||] Darwin.

[¶¶] Tylor, "Anthropology."

[***] Bray, "Anthropology."

A tribe of Berber Tuaryk, who by their language are evidently of a race similar to the Arabian, have complexion, skin, and hair like negroes, due to long-continued agency of physical cause.[*] Arabs who inhabit the valley of the Jordan have flatter features, darker skins, and coarser hair than any other tribes, a peculiarity attributable to the constant and intense heat of the region.[†]

It is climate more than any other one thing that has tended to make the Aryan of India so different from the Aryan of Persia.[‡]

A peculiar race of people inhabiting some islands in the Sea of Bengal have black skin, and frizzled hair which is flat on section, in these points resembling negroes; their skulls are not narrow, but broad and round; the lips less full; the nose less wide, and the jaws not so projecting. Anatomists have classed these as the primitive Negro type, and their difference from others of the same illustrates how great an alteration may take place when a race is subjected to different external conditions.[§] As negroes spread south into the Congo region, they have less full Negro complexion and features. The Bushmen may also be regarded as a modification of the Negro type. The Negro in the United States is a few shades lighter in complexion, and has altered features. The white is less rosy, with darker and more glossy hair, more prominent cheek-bones, and has a massive lower jaw.[||]

Bodies and limbs become elongated when Europeans settle in America.[¶] This is probably due to the dryness of the atmosphere causing more evaporation.[**] The stature of the American Indian and the great development of muscular processes on the bones of the limbs are consequences of abundant food, a temperate climate, roving habits in a wild country, and being without beasts of burden.[††]

While we may read in some books the assertion that the differences in races are not due to the climate, it is claimed that among many thousand negroes who came under his observation, there was no one who could lay claim to the regular Caucasian features with which some travelers have endowed certain Negro people.[‡‡] American families residing in Pennsylvania without intermingling with others, preserve the characteristics of their stock. The Jews have not been changed, but are typical, notwithstanding that they have resided in all parts of the world. The conclusions regarding the Quichuas' lungs becoming larger, due to a more rarefied atmosphere, are unobjectionable, but there is a population along the Arctic Sea in Siberia whose chests are just as large.[§§]

Physically different races, such as Bushmen and Negroids in Africa, show no approximation under the same climate;[||||] while on the other hand the coast tribes of Terra del Fuego and the forest tribes of Brazil continue to resemble one another in spite of extreme differences of climate and food.[¶¶]

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[*] Pritchard.

[†] Foster.

[‡] "Races of the Old World."

[§] Tylor, "Anthropology."

[||] Ibid., M. Elisée Reclus, Lyell.

[¶] Darwin, Beard, Harlan, Vogt.

[**] Dr. Beard, Vogt.

[††] Brace, "Races of Mankind."

[‡‡] Pruner-Bey, Vogt. M. l'Abbé Brasseur.

[§§] Vogt.

[||||] Tylor, "Anthropology." Winchell.

[¶¶] Tylor.

A French statistician who has been studying the military and other records with a view of determining the height of man at different periods, has reached some wonderful results, says the Philadelphia *Times*. The recorded facts extend over nearly three centuries. It was found that in 1610 the average height of men in Europe was five feet nine inches. In 1790 it was five feet six inches; in 1820 it was five feet five inches and a fraction. At the present time it is five feet three and three-quarters inches. These figures are given to show that the same people in the same countries are diminishing in height.

Fair races have inhabited North America, and the dark races South America and Mexico. Both have displaced the aborigines, but have not approximated them in type. We have no more reason to suppose that an Anglo-Saxon will turn into an Indian, than imported cattle into buffaloes. There are many examples of complexion and hair resisting climate for centuries, without the slightest alteration. We know of no authentic instances where radical changes of complexion or hair have been produced.

The Magyar race of Hungary have suffered no changes during their residence of one thousand years in Hungary. In the heterogeneous population of the United States we can trace the ancient European races.*

We are all familiar with the fact that people living in limestone regions in Virginia, Michigan, Kentucky, and California develop larger osseous systems than those who live in other parts. I have frequently observed that young people who live in towns supplied with water from artesian wells develop into large-framed men and women. This is due to the larger quantity of calcium salts taken into the system in the form of food and water. To such an extent are these calcium salts assimilated that people of middle age are known to possess more tartar upon the teeth, gall-stones, stone in the bladder; and if their urine were examined, large quantities of calcium deposit would be found. These abnormal conditions show that more is taken in than can be appropriated, and the system expels the surplus. Another condition which shows the benefits derived from change of soil and climate is in cases of long sicknesses and breaking down of tissues, as noticed in tuberculosis of the lungs; frequently arrest of development takes place in young children as a result of constitutional diseases. These changes, when properly made, are always beneficial. The system, especially the osseous system, takes on a new lease of life, and the individual who would soon pass away lives for many years.

CITY *versus* COUNTRY LIFE.

It is a well-known and recognized fact that the people of the city are of lower stature, lighter limb, and are more susceptible to the ravages of disease. That mortality is greater and longevity less in the city as compared with the country, is too well understood to need much discussion.† The mortality is two and one-half times greater in the city than in the country.‡

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* Nott and Gliddon.

† Mr. Stockton-Hough, "Relative Influence of City and Country Life."

‡ Professor Donaldson; Sussmilch; Drs. Jarvis, Farr, Berg, Herz, and many others.

The following table will serve to show the comparative mortality in large cities, smaller cities, and country.*

Mortality of country is 1 : 35, 1 : 40, 1 : 50, even up to 1 : 100.
“ “ small cities, 1 : 25, 1 : 28.
“ “ large “ 1 : 24, 1 : 20.
Mortality of city to country is 1 : 12.†

Fatality of disease is also much higher in city as compared with country life.‡

Diseases of lungs are twice as fatal in city as in country.
“ “ digestive system, 2½ times as fatal in city as in country.
“ “ nervous “ 5½ “ “ “ “ “
Epidemics are fourfold as fatal.
Convulsions are tenfold as fatal.

It has been said that a family living continuously in London, and intermarrying with families who have resided in London constantly, would die out in three generations. Again, a family living in London for two hundred years and marrying among people not less old, would become extinct within the two hundred years.§

If all the people of the world lived in cities, the human race would become extinct in two and one-half centuries ;|| in all probability the mortality would be greater the larger the cities. It has been shown that women attain greater longevity in the city than in the country. In the country the life of women is monotonous ; the brain is used very little, and very little recreation is taken ; the hours of work are very long, from early morning until late at night, thus insufficient sleep does not give the body time to recuperate. Longevity of men is lessened by residence in the city, no doubt due to closer confinement and more hazardous occupation. We also find that dissipation and intemperance are increased.

The greater mortality of cities is due to foul air, constitutional syphilis, and intemperance.¶ To these may be added irregular hours, want of exercise, unhealthful and more hazardous occupations, undue excitement of the nervous system, less pure water, unwholesome food, unhealthful dress, and an overcrowded condition of the people, especially in tenement-houses and flats. We must not forget the fact that country people are continually thronging to the city, and by intermarriage with city people infusing new blood and new life into them. This fact no doubt adds much to lessen the mortality of the city.

That the quantity of oxygen is sensibly diminished in the air of large cities, even in the open street, cannot be denied.** The large number of people congregated in a small area, together with the artificial means, if we may so call it, of using up oxygen by means of increased fires and light, would naturally reduce the oxygen in the air and increase the carbon dioxide ; add to this the fact that vegetation is utterly wanting, which is the chief factor in using up the superfluous

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[*] Sussmilch.

[†] Graunt.

[‡] Mr. Stockton-Hough, Ibid.

[§] Mr. James Cantile. J. Milner Fothergill.

[||] “ Relative Influence of City and Country Life.”

[¶] Dr. Morgan.

[**] Professor Wilson.

carbon dioxide and supplying us with free oxygen. The amount of sunlight is also diminished. Now, when these two conditions exist, we would naturally expect to find lessened physical development. "Light is the very life-blood of nature, without which everything in nature would perish utterly."* When blood passing from the lungs, where it does not obtain a supply of oxygen, carries to the brain and other tissues and organs carbon dioxide, the consequence of an arrest in the changes necessary to life and growth would result.† The effects of carbon dioxide poisoning are far-reaching. Through the brain it affects all tissues of the body. Lack of pure air and of bracing air creates a distaste for exercise; active exercise, but exercise not carried to excess, keeps up the equilibrium between waste and repair.‡ Another cause of the lack of exercise is the facility with which different parts of the city may be easily reached by means of street-cars, cabs, busses, etc. Then, also, we find that people in the city are more hampered by dress than those in the country, which is a cause for deficiency of exercise. We also find in the city a lack of suitable places for exercise. Now, since deficiency of exercise exists among city people, we would naturally expect to find deficiency of physical development, which is the case. The city-born criminal is found to be inferior physically to the country-bred.§ Biologically, man is a fresh-air animal;|| exercise in fresh air increases the activity of all organs of the body. Muscular activity demands activity of the circulation to keep up the equilibrium of waste and repair. Muscular activity creates increased activity of all the eliminating organs, to rid the body of the products of the disintegration of molecular activity of muscles. The circulation being increased, the respiratory system is increased to meet the greater demands for oxygen. This brings about a vigorous action of all the organs of the body, and, being a physiological process, if kept within physiological bounds no harm but good can result. This course of living was carried out in the patriarchal age. There was moderate activity of all the organs of the body; there was repose to the nervous system; the appetite was normal, digestion was healthy, and there was exemption from local causes of disease. No other causes of death occurred, save those arising from accidents and old age.¶

The converse of muscular activity producing well-developed physical condition must be true; *i.e.*, lack of exercise will cause lessened physical development.** Animals which for generations back have taken little exercise have their lungs of smaller size, which moderates the form of the bony fabric of the chest, and later affects the form of the body as a whole. With our anciently-domesticated birds, where wings have been little used, their size is somewhat diminished and we find the sternum, coracoids, and scapulæ modified in form.†† The decrease in the amount of exercise must cause a decrease in the appe-

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* Sir David Brewster.

† Dr. Bell, "Perils of School-room."

‡ Dr. Darbishire, "Recreation."

§ Dr. Beddoe.

|| Dr. Darbishire, "Recreation."

¶ Dr. Smith, "Limitations and Modifying Conditions of Human Longevity."

** Herbert Spencer, "Physical Education."

†† Mr. Darwin.

tite or create an abnormal appetite. The country-bred person therefore eats pastries, meat-pies, and hearty food, and has no difficulty in digesting them. He has plenty of fresh milk, butter, and vegetables; the milk, from the presence of the phosphate salts, heightens stature.* The city person cannot eat meat-pies and pastries at all, therefore he rejects them.† He finds that he can eat meat; as a consequence he partakes largely of a flesh diet, but his exercise is hardly sufficient to digest this. If he is not strong enough it passes through the alimentary canal undigested, partly decomposed, causing in some cases only abdominal tenderness, in other cases other evils.‡ If the digestion is strong enough to digest this food, additional work is thrown upon the liver and kidney. Uric acid is one of the products of the oxidation of flesh food.§ It is excreted by the kidneys, and sets up interstitial nephritis. Uric acid is also a cause of gout.

Again, the city-bred person rejects all fats, which are necessary to healthy tissue; he rejects them because the greater part of his life is spent in an overheated room. People who live among the Esquimaux soon acquire a relish for whale-blubber and all the fats and oil they can obtain.‖ This lessened use of fats, and diminished oxygen and sunlight, are the great causes of pulmonary consumption, which claims twenty-five per cent. greater mortality in the city than in the country.¶ Deficiency of breast-milk in mothers is a cause of stunted growth,** and want of good cow's milk is also a cause. Early and copious use of alcohol, and intemperance; want of opportunity and stimulus for the development of their physical powers by young persons in town, the earlier occurrence of puberty,†† and greater frequency of youthful profligacy‡‡ are among the etiological factors of stunted growth. The crowding of people in tenements, where breathing of effluvia over and over occurs, also the crowding together of pauper population in cellars and underground rooms, must act as fruitful causes of deformities and disease. These houses are often erected on land made of sweepings of streets, where the streets are narrow and filthy. The sewerage is often inadequate to the demands, and the contents of cess-pools surcharge the porous earth.§§ Wherever such conditions are met with, sickness must prevail, and thus all physiological processes, growth, and development will become perverted.

In the city the constant excitement hastens the development of the nervous system, which is the center of the nerve-force supplying all the organs of the body. Unrhythmical, harsh, and jarring sounds cause molecular disturbance of the system. Specialization must have a baneful effect upon the body. The exclusive concentration of mind and muscle to one mode of action is both negatively and positively pernicious, and more so when accompanied by bad air in overheated and ill-ventilated apartments.* Close confinement in school-rooms, together with competition, which must necessarily follow from our public school system, must work ravages upon the system, especially the nervous system, of the children, united as it is with the pernicious conditions existing.† In addition to the school duties, the city child has usually to pursue the study of music, painting, and the like, from all of which the country child is free. All these must necessarily produce an artificial condition of life, under which condition a degenerated physique is found and more deaths must occur.‡ The child is ill equipped to meet the demands of physical life, and therefore it cannot meet the demands made upon the brain and nervous system.

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* Beddoe.

† J. Milner Fothergill.

‡ Dr. C. K. Chambers, "Dietetics."

§ Fothergill; Dr. Chambers.

‖ Darwin.

¶ Professor Donaldson.

** Beddoe.

†† Quietelet, "On Man."

‡‡ Beddoe.

§§ Dr. Clendenin, "General Causes of Disease"; Dr. Jas. Johnson; Carl Pfeiffer.

Population tends to concentrate more and more in dense masses. In some of our older states from fifty to seventy-five per cent. of the whole population live in cities numbering eight thousand or more. Registration reports of Massachusetts, which have now been published for forty-seven years, show that in thirty years—from 1850 to 1880—the average age of all persons who died in Suffolk, in which Boston is included, was twenty-three and one-third years. The corresponding age in Barnstable county, also on the seaboard, was thirty-seven. In Franklin county, an inland rural county, it was thirty-eight and one-half years, while in the island county of Nantucket it was 46.15 years, nearly double that in Suffolk county, thus showing that the uniform higher death-rate is greater in densely-populated counties.§

In the town of Sharon, Norfolk county, Mass., which is the highest point of land in the eastern part of Massachusetts and has a population of about thirteen hundred, the average longevity is sixty-four years.

Results arising from the Union of Different Nationalities.

Mr. C. J. Jones, of Garden City, Kansas, who has produced at least five distinct races of cattle by crossing with the buffalo, says that "each of these races is perfect in every respect. Their flesh is rich and good, and there is a great deal of it. Their milk and butter are of the very best quality, and their fur is glossy, heavy, and warm." A peculiar part of the experiment in crossing developed the fact that the breeding could not be developed with a Galloway bull and a buffalo cow. The crossed animals have a tendency to look like buffalo, rather than like their domestic ancestor, and cases are frequent in Mr. Jones's herd where apparently perfect buffaloes have resulted from the intermingling of the species.|| The fur comes from the three-fourths and seven-eighths crosses, and even the fifteen-sixteenths cross develops excellent hides. Close confinement deteriorates the health status of a buffalo, showing that these animals will not retain their healthy condition when placed in close confinement. The illustrations are given to show that when different breeds are crossed, the offspring exhibit a change in the osseous system.

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* Dr. Beard, "American Nervousness."

† Sir John Sinclair.

‡ Dr. Price.

§ President C. W. Eliot, "Family Stocks in Democracy."

|| *Chicago Tribune*, January 20, 1891.

Breeders are crossing races every day for some purpose, and they expect a few irregularities more or less marked in the first generation; but they know that the race will soon settle, while the disorder would only increase if the crossing had taken place between species.*

When Dorking fowls with five toes are crossed with other breeds, the chickens often have five toes on one foot and four on the other. Some crossed pigs raised by Sir R. Heron between the solid-hoofed and common pig had not all four feet in an intermediate condition, but two feet were furnished with properly divided and two with united hoofs.†

Heterogeneous races have by intermixture given rise to raceless masses, people which present no fixed characters, and who form, so to speak, dispersive circles around the original species, which at their points of contact become confluent.‡

Pure races exhibit a more uniform type, and the mixed races a variegated type, and this variation increases as the intermixture increases.§

When we hear of a people which, despite a low state of intellectual culture, exhibits a variety in features, nose, lips, as for instance among the Tschuvashes, we shall not be wrong in considering it as of mixed origin.

The Samboes, descended from an Indian and Negro, in the south of the United States, present sometimes crisp hair with copper-colored skin, and all other Indian characteristics, and sometimes the coarse hair of the Indian upon the head of the Negro, with a black skin. There is here no intermediate type produced by intermixture, but there is produced an irregular agglomeration of the characteristics of the parent forms.|| It might be demonstrated that these different races, the people of Northern Italy, Southern Germany, Great Britain, not to speak of the United States, where the fusion of blood is probably inexplicable, have given birth, by their intermixture, to ethnological modifications still recognizable. In all these countries the instability of anthropological characters is in contrast with the fixity which marks pure races.¶

The union of different nationalities is more common in this country than in any other; due, no doubt, to the fact that people of all countries and nationalities flock here to better their condition in life. We would expect that marriages would naturally result from a commingling of these foreign elements, especially in the newer parts of the country. Immigration of different nationalities, and intermarriages which take place, tend to improve the race physically in some respects, and in others degeneracy results. Inasmuch as the tendency in this country is toward the production of small jaws, while the jaws of foreigners are much larger, the offspring of such marriages would naturally inherit the extreme peculiar characteristics of both parents. Such peculiarities are very noticeable in the tribe of Marshpee Indians on Cape Cod. The present people are descendants of the original Indians, who married among the whites, negroes, and Portuguese. These intermarriages have continued down to the present generation, making seven or eight generations in all, until, as Professor Putnam, of

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* Quatrefages.

† Darwin.

‡ Vogt.

§ Waitz, "Anthropology."

|| Ibid.; Forey on Schoolcraft.

¶ Broca, "Hybridity in Genus Homo."

Harvard College, has said, "there is very little Indian blood left." There are, however, three or four of the older people who still retain all the characteristics of the early Indian race. It is very interesting to observe the peculiar features of the younger generation, a few of which I will describe. A little girl, eight or ten years of age, presented all the peculiarities of the Negro,—broad nose, thick lips, dark skin, with the long, straight, black hair of the Indian, reaching nearly to her waist. Another, Mrs. H., whose mother is half white, father Negro; she is full Negro in appearance, except the skin, which is copper-colored. The jaws are slender in outline, and quite unlike the father's. Mr. K., great-grandfather, Negro; mother, Indian; father, three-fourths Indian. He has large jaws like the Negro; long, straight hair, copper-colored skin, high cheek-bones. Mr. P., maternal grandfather, Portuguese; paternal grandfather, Negro; paternal grandmother, Indian and white; maternal grandmother, Indian and Negro. He has fine curly short hair, Negro nose, high cheek-bones, large jaws and teeth, upper and lower teeth occlude. I could give from my note-book many other illustrations of these marked changes in bone-structure and also peculiar mixtures produced by the union of different nationalities, but enough has been said in regard to this tribe to show that when there is a union of different nationalities, the offspring inherit not only the peculiarity of one parent, but frequently possess a mixture of the peculiarities of both. A similar class of people made up of a union of Indians and Negroes is located in South Carolina, and called by the people "Red Bones." They have been thus described in an interview with Senator Hampton: "They live in small settlements at the foot of the mountains, and associate with none but those of their own race. They resemble in appearance the gypsies, but their complexion is red. This intermixture, which is common in the Carolinas, produces marvelous results. It takes the kink out of the hair of the African, strengthens his features, and improves him in every way except in temper."

These inherited peculiarities do not cease at the first generation, but are transmitted to at least the seventh or eighth generation, as I have shown in the cases of the Marshpee Indians. It would seem that, from these cases, race peculiarities under favorable circumstances might be carried on indefinitely. There is a tendency on the part of these Indians, due no doubt partly to the mixture of white blood and partly to the soil, climate, and environment, to take on the general make-up, as regards the osseous system, of the native white people. So far as my investigations went, I was unable to observe the high vault, irregularity of the teeth, and the neurotic condition so noticeable among the native white people. While they possess the same facilities for schooling, they lead a very quiet life of farming, fishing, and out-door work generally. The trades, professions, and such lines of work are not sought after, and hence neurotic conditions are not found.

The improvement of the "Red Bones" over the Negro by "straightening his features," mentioned by Senator Hampton, must necessarily consist of a change in the bones of the face. These changes must be brought about by the union of the Negro with the Indian, producing children not unlike those already mentioned in connection with the descendants of the Marshpee Indians. Americans are all familiar with the changes that have taken place in the features of the Negro, due to their consorting with the whites. The lower jaw of the children diminishes in size from generation to generation, and the anterior lobes of the brain increase posteriorly, the vertical portion of the frontal bone assuming more of a right angle with the horizontal portion. In this manner the Octoroon and Quadroon possess in many cases beautiful features.

(To be continued.)

TRANSFORMISM.

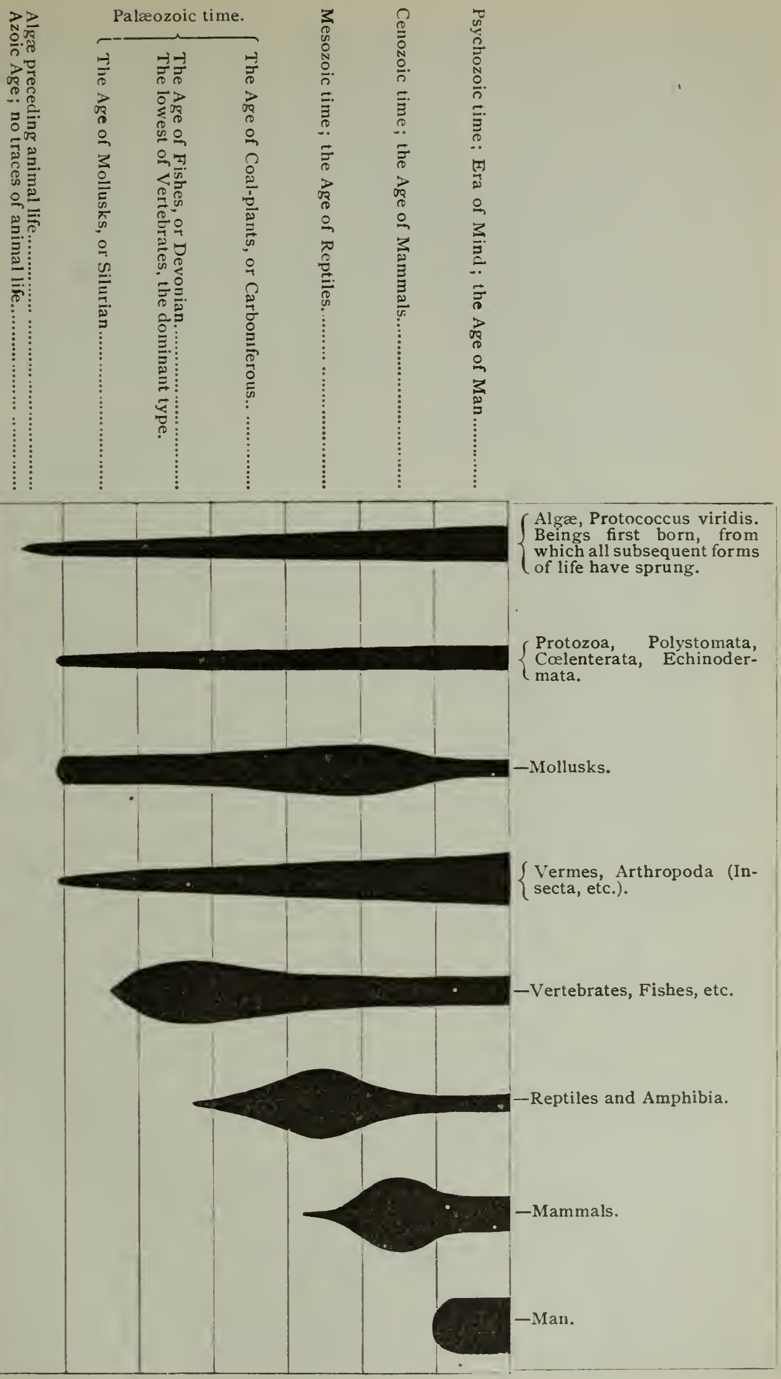
BY C. N. PEIRCE, D.D.S., PHILADELPHIA, PA.

(Continued from page 267.)

As it is the purpose of this paper to record some of the geological and biological evidences of derivation by transmutation, the accompanying diagram (page 435), slightly modified, has been taken for illustration from Dana's Geology, with the hope that it will add to the clearness of the article. The different ages which are there diagrammatically represented as having their limitations between the horizontal parallel lines, it must be remembered, are not so limited in fact. Geological history, like human or animal history, is one continuous progression, and while successive epochs and periods are recognized, it is not more possible to confine them within prescribed limits than it would be to confine the development or history of an individual within the periods of the embryo, the infant, the youth, the adult; and no one would think of specifying the day, the week, or the month when one of these progressive changes began or ceased. The summit or culmination may be noted as the center of a special period, but the germ or incipient stage of that period was in preceding time, working onward probably thousands, or it may have been millions, of years before it came to its full development with all the characteristics of a new era in this continuous and everlasting progress.

In geological history the earliest events were simply physical, and had to do with the inorganic, and not until certain progressive steps had been taken in the line of the earth's development was it prepared for the introduction on its surface of a primitive form or kind of living being, and for the fulfillment of the declaration that "God formed man of the dust of the ground." With the introduction of this primitive form—the first-born—science is prepared to explain the production of all subsequent forms which, from the remotest period through successive ages down to the present time, have exhibited an infinite number of beings possessing the most variable degrees of complexity, culminating in man and his contemporaries. The hypothesis upon which this is based is, as has been stated in a previous paper, "that all living beings have been derived from one another, the most complex and highest forms of plants and animals being the slowly modified descendants of less complex plants and animals, while these were the slowly modified descendants of still less complex forms, and so on until we go back to the earliest and simplest single-celled plant, the Protococcus viridis,—this, the first-born, being the product by adaptation of conditions attained through geological changes; this process being the same in kind as that daily observed in operation around us. Witness the variation in plants and animals, their adaptation to environing conditions, and the hereditary transmission of acquired individual peculiarities.''

The ultimate chemical elements of living matter which are essential to the production, growth, and development of living beings have but one source of origin ; that is the mineral kingdom. From this they must be derived. The process must be, however, through their appropriation by the vegetable kingdom and the influence of a resident force. The complex combination which is thus formed (protoplasm) does not pre-exist in the mineral kingdom, but is manufactured by the green plant, under the influence of the solar ray, from the inorganic elements of water, carbon dioxide, and ammonia. From Haeckel's ''History of Creation,'' pages 184, 185, the following extract is taken, from which it might be inferred, though not so expressed, that he and Huxley believed that this important material (protoplasm) had come into existence through some fortuitous combination of inorganic elements, without the intervention of the vegetable cell. He says, ''The very simplest of all organisms yet known, and which at the same time are the simplest imaginable organisms, are the *Monera*, living in water ; they are very small living corpuscles, which, strictly speaking, do not at all deserve the name of organism. . . . The entire body of one of these Monera, during life, is nothing more than a shapeless, mobile, little lump of mucus or slime, consisting of an albuminous combination of carbon. . . . The first complete observations on the natural history of a Moneron (*Protogenes primordialis*) were made by me at Nice, in 1864. . . . But perhaps the most remarkable of all Monera was discovered by Huxley, and called *Bathybius Hæckelii*. 'Bathybius' means living in the deep. This wonderful organism lives in immense depths of the ocean, which are over twelve thousand--indeed, in some parts twenty-four thousand—feet below the surface, and which have become known to us within the last ten years through the laborious investigations made by the English. There, among the numerous Polythalamia and Radiolaria which inhabit the fine calcareous mud of these abysses, the Bathybius is found in great quantities, sometimes in the shape of roundish, formless lumps of mucus, sometimes in the form of a net-work of mucus, covering fragments of stone and other objects. The entire body of this remarkable Bathybius consists solely of shapeless plasma, or protoplasm. . . . When the Moneron moves itself, there are formed on the upper surface of the little mucous globule shapeless, finger-like processes, or very fine radiated threads ; these are the so-called false feet, or pseudopodia. . . . All Monera propagate themselves only in an asexual manner by monogony,'' and by that kind of monogony which is placed at the head of the different forms of propagation,—that is, by self-division. For an example, when such a little globule or mass of protoplasm has attained a certain size by the assimilation of foreign albuminous matter, a contracting in the middle of the globule on all sides takes place until it becomes so attenuated it falls apart or separates into two halves ; each half then becomes an independent individual, which commences anew the simple course of the vital phenomena of nutrition and propagation. Other Monera in the process of propagation fall into four equal parts, and others again into


Azoic Age; no traces of animal life
Algæ preceding animal life
Palæozoic time.
The Age of Mollusks, or Silurian
The Age of Fishes, or Devonian
The lowest of Vertebrates, the dominant type.
The Age of Coal-plants, or Carboniferous.
Mesozoic time; the Age of Reptiles
Cenozoic time; the Age of Mammals
Psychozoic time; Era of Mind; the Age of Man
Algæ, Protococcus viridis. Beings first born, from which all subsequent forms of life have sprung.
Protozoa, Polystomata, Cœlenterata, Echinodermata.
—Mollusks.
Vermes, Arthropoda (Insecta, etc.).
—Vertebrates, Fishes, etc.
—Reptiles and Amphibia.
—Mammals.
—Man.

any number of small globules of mucus, each of which again, by simple growth, becomes like the parent. This simple method of propagation by self-division is, in reality, the most general of all the different modes. It is by this same simple process of division that *cells* propagate themselves ; and cells are those simple organic individuals, a large number of which constitute the bodies of most organisms, the human body not excepted. Protoplasm is the all-important, the essential element of all animal structures, and is by embryologists recognized as the physical basis of all organized beings. While the animal consumes it and returns its inorganic constituents to their original source, it takes no part whatever in its production. Every simple single-celled green plant immersed in its superabundance of food is a chemical laboratory for the production of protoplasm, and thus manufactures food for the animal, which must obtain it either in this way or by waging war and preying upon some other animal which had previously obtained it from the plant.

As before stated, the only direct source of protoplasm known is the green plant ; it necessarily follows, then, that as illustrated in the diagram, in the order of origin this must have preceded the animal ; and if the doctrine of the evolution of life, higher forms proceed from lower, be true, then this simplest of green plants, the single-celled protococcus, is the first born, and ancestor of all subsequent forms of life. This we assume is in correspondence with the doctrine of evolution or transformism, and it is not in violation of this law that the original primitive form may have continued without material change through the succeeding ages up to the present.

The law of transformation does not necessarily require change of the primitive form. Transformation may go on successively, producing new and diversified forms, some of these advancing in complexity and acquiring new habits in correspondence with new conditions or changed environment, while others, again, may retain their original form, or any subsequent one, through all future time.

In further explanation of the diagram let us note the following important principles from Dana's "Manual of Geology." First, "The reality of an age in history is marked by the culmination of some new idea in the system of progress." Secondly, "The beginning of an age will be in the midst of a preceding age ; and the marks of the future coming out to view are to be regarded as prophetic of that future." Thirdly, "The end of an age may be as ill defined as its beginning, although its culminant point may stand out boldly to view." "Thus the age of Coal-Plants was preceded by the occurrence of related plants far back in the Devonian." "The age of Mammals was foreshadowed by the appearance of mammals long before, in the course of the Reptilian age." "And the age of Reptiles was prophesied in types that lived in the earlier Carboniferous age." The general principles in the progress of life upon which the ages are based are represented in the diagram, the horizontal lines representing the ages in succession, and the vertical figures corresponding to the different groups of organisms, with the effort to indicate by their forms and lengths, their beginning, their maximum, and their decline.

The existence of the globe at one time in a state of universal fusion, or as an incandescent sphere, is accepted without reasonable doubt ; so from this period down to the time when the waters and climate became fitted to sustain animal life, however lengthy it may have been, probably thousands and thousands of years, is the age which has been termed Azoic, and it must therefore stand as the first in geological history, and also as the age, as the term would imply, preceding the appearance of animal life. The fact, however, of the existence of limestone strata in this age, the Azoic, would indicate that there had existed vegetable life in great profusion,—Algæ in the shape of single-celled plants, some of which secreted siliceous shells, followed by the Foraminifera (Rhizopods), by the accumulation of whose minute (microscopic) shells the chalk or limestone beds must have been largely formed. While it is admitted that the limestones and graphite (black lead) found in this strata may have been of chemical origin, yet the evidence is strongly in favor of these being the result of vegetable and the very lowest forms of animal life. In the gradual cooling of the globe, a temperature that would be tolerated by vegetable life would have been reached long before one that would sustain animal life, so the evidence is all in favor of the single-celled Algæ long preceding in existence the Foraminifera.

Before entering into a description of the forms of life which it is claimed have been evolved from the simple homogeneous, structureless beings, let us note one quite important fact, bearing with much force on the evolutionary origin of man,—the product of descent with modifications,—and that is the very late appearance upon the earth of the Mammalian period or age, and especially man himself. Estimating from the earliest part of the Palæozoic period, when a variety of invertebrates prevailed, to the most recent of the Cenozoic period, or age of Man, we shall find that but a very small part of this time has man occupied. Assuming the estimate which has given him twenty-five thousand years upon the earth to be approximately correct, and that his period is about the one-twentieth of the time since the birth of the Palæozoic age, it would give us five hundred thousand years. Sir James Croll, from his latest researches on the subject of man's antiquity, concludes that man has existed at least two hundred and fifty thousand years. Through this period it is more than possible that as marvelous and indelible a history of events has been written upon the rocks of the different ages as it will ever fall to the lot of man to read.

In our discussion of this subject it is a matter of interest, as well as of importance, to note the gradual change in the structural arrangement of animals, growing as they do more and more complex as we advance from the most remote to the more recent or present period, era, or age. And in referring to the animal kingdom it must be understood that the whole series of both living and extinct species is included. In the classification of these, zoölogists have varied materially, the more modern having much increased the number of groups, but the division here adopted will be a modification of this, yet sufficiently extended and comprehensive to embrace the typical forms. In Haeckel's "History of Creation," page 132, there is a classification which, with the description of each, shall be utilized with slight modification. The object of classification is to bring together those animals which are alike, and separate those which are unlike, yet each group and sub-kingdom must embrace animals which vary very considerably in appearance and external characteristics, but still have a uniform plan of structure by which they can be recognized.

1. Protozoa, the animalcule sub-kingdom, embracing animals which are single-celled and have neither a general body-cavity nor a nervous system; the substance of the body *is not* differentiated into histogenetic elements which by their metamorphoses and arrangement give rise to tissues,—a simple homogeneous mass, depending upon the power of locomotion by improvising roots or feet, or, more properly, root-like feet (pseudopodia),—and also depending upon the function of digestion and nutrition by improvising a stomach.

2. Polystomata, the sponge sub-kingdom, animals which have an internal cavity or many ingestive apertures (Porifera), with no parts or organs set aside for special purposes, but simply consisting of many cells.

3. Cœlenterata, the jelly-fish sub-kingdom, animals with a stomach-cavity, and a body-cavity extending out from this. The parts of the body are arranged regularly around a center, as spokes of a wheel are around the hub; they consist of many varieties.

4. Echinodermata, the star-fish sub-kingdom, animals with a body-cavity separate from the stomach, a nervous system, and a system of water-tubes, which aid the animal in locomotion: the symmetry more or less completely radiate.

5. Vermes, the worm sub-kingdom, animals which consist of two halves, or have bilateral symmetry; are composed of a series of joints or segments, have no jointed limbs, and have a water-tube system, which does not aid in locomotion.

6. Mollusca, the shell-fish kingdom, anmials which have soft bodies covered by a leathery portion called the "mantle," no jointed limbs, a circulating system, often a shell outside the body, and frequently an unsymmetrical nervous system,—that is, one in which there are not two equal or nearly equal sides to each part.

7. Arthropoda, the crab, spider, and insect sub-kingdom, animals which have bodies made up of a series of joints, a symmetrical nervous system, a skeleton outside of the body, and jointed limbs. The aggregate of animals included under this head possess great diversity anatomically and physiologically; with many, adaptive modifications are such that changes of external conditions readily induce changes of form. In some, the progress from the embryo up to sexual maturity of the adult may be direct and without metamorphosis, while others undergo such a succession of transformations that in some stages they could readily be mistaken for a mature form of some other animal.

8. Chordata, Urochordata, Ascidians, Cephalo-chordata, Amphioxus, and the backbone sub-kingdom, true vertebrates, which have an internal skeleton, a brain, and a back-bone. In these, the organs of circulation and motion may be recognized as primary, while in the higher orders, the dental and other structures connected with digestion define divisions of secondary importance, and have a constant relation to organs of movement, as illustrated in most of the Carnivora in their prominent canines and lacerating molars, short alimentary canal, simple digestive apparatus, and walking on their toes (instead of flat on the foot), as all animals do when speed or swiftness is an object, the toes in the Carnivora having claws.

Haeckel has also divided the branch or department of Vertebrata into—

I. Cyclostoma—Lampreys and hags.
II. Ichthyopsida—Fishes and Amphibia.
III. Sauropsida—Reptiles and birds.
IV. Mammalia—Placental and non-placental; with the Mammalia subdivided into smaller groups, as follows:

1. Monotremes—Australian duck-mole, etc.
2. Marsupials—Kangaroo, opossum, etc
3. Edentates—Ant-eaters and armadillos.
4. Sloths.
5. Sirens—Dugong, manatee, etc.
6. Ungulates—Horse, rhinoceros, hog, deer, etc.
7. Cetacea—Whales.
8. Pinnipeds—Seals and walruses.
9. Carnivores—Cat, dog, weasel, and bear.
10. Hyracoidi—Conies.
11. Rodents—Rats, mice, squirrels, rabbits, hare, etc.
12. Proboscides—Elephants.
13. Lemurs—Aye-aye, etc.
14. Insectivores—Shrews, moles, hedge-hogs.
15. Cheiropters—Bats.
16. Primates—Monkeys, apes, man.

In following the geological record, the change from one kind or species of animal to another so abruptly would seem to be by substitution rather than by transmutation, and it is in recognition of this seeming condition that special creationists urge that the development theory—higher forms from previously existing lower ones—is not proven. The answer to this is, first, the extremely fragmentary character of the geological record, the existing floras and faunas—plants and animals—being but isolated remnants, the intermediates having been destroyed by migrations, conflicts, etc. Also the evidence that certain of the older rocks show, of having been heated, even to melting, since they were deposited, so that it would have been impossible for fossils to have been preserved in them. But while it is true there are many wide gaps in the record, it is also true that where the conditions for the preservation of fossils were exceptionally good, the evidence of abundance of life is very great and the record of some forms continuous. To quote a paragraph from Joseph Le Conte, to whom we have previously expressed our obligation for data: "On every side and everywhere, both in existing faunas and in fossil forms, but especially in the latter, we find innumerable examples of transitions, or intermediate forms, between all the *higher groups*, such as genera, families, orders, and classes. It is, in fact, by means of these that the great law of differentiation from generalized types has been established. It is therefore only between *species* that such intermediate forms are rare." In a paper published some months since by Colonel Joseph Willcox, on recent and fossil shells, the evidence of transmutation was unmistakable. In passing from the lowest to the highest, the forms change greatly many times, the extremes being so different that were it not for intermediate forms they would be called not only different species but different genera, and yet the gradations were so slight that the whole series was nothing less than an undisputable demonstration of the origin of species by derivation with modification. Professor Cope also has given us evidence that the most accurate or unmistakable gradations can be traced between some surviving as well as extinct Mammalian species. One of the most satisfactory of these is the history of the horse family, which affords the very strongest evidence in favor of the theory of transmutation by comparing the structure of the existing or modern horse with the past history of the race as revealed by fossil remains. The various rudimentary and apparently useless structures which are persistent in the existing horse, and which correspond to structures which are fully developed and functional in other animals, are important features helping to establish the continuity of the ancestral line.

The query may naturally arise, Are these rudimentary structures in process of development, or of atrophy and disappearance? It might be difficult to say which, but for the evidence which comes from the parts in question being in a fully developed state in allied though less specialized animals. Palæontology furnishes the knowledge that renders it almost certain that the horse as we meet with him to-day belongs in his existence to a very late period of the world's history. This animal is regarded by Professor Cope and others as one whose history can be traced through a nearly complete chain of links as far back as the early Tertiary or Cenozoic age; and while the record is not yet complete, every additional discovery has been in the line of corroboration of the theory that modern forms have been the gradual product of the modification of pre-existing ones. Of the rudimentary structures to which allusion has just been made, we may mention: 1, "wolves'" teeth, small rudimentary organs, evidently the remains of an atrophied premolar; 2, "false nostril," a blind pouch or diverticulum from the nasal passage, with which it communicates, and lined by a continuation of the same smooth mucous membrane which lines the passage. Veterinarians have not been able to discover that it had any special interest in the economy of this animal, but was rather a rudimentary condition or survival of a structure which is more conspicuously developed in some of the more primitive forms of animals in the ancestral line. The "ergot," a callous substance behind the pastern joint, much smaller in the horse than the ass, and considered by W. H. Flower to correspond both by structure and position to the palmar or plantar pads of those animals which walk more or less on the palm and sole. The same author says, further, "Owing to the modified position of the horse's foot, standing only on the end of the last joint of the one toe, this part of the foot no longer comes to the ground, and yet the pad with its bare and thickened epidermic covering, greatly shrunken in dimensions and concealed among the long hair around, and now apparently useless in the economy of the animal, remains as an eloquent testimony to the unity of the horse's structure with that of other mammals, and its probable descent from a more generalized form, for the well-being of whose life this structure was necessary." The "splint-bones,"—one on either side of the leg,—or cannon-bone, reaching down nearly to the pastern joint; these are remnants of organs that were once useful to the ancestor of the horse, and represent respectively the second and fourth metacarpals of the human hand. Above, they have thickened heads, which articulate in the usual manner with the carpal bones; but below, they taper off almost to nothing, ending, as just stated, above the pastern joint. It is said that if no other evidence were at hand of the horse's five-toed ancestors, the condition of the muscles of the foot would sufficiently indicate them, "for the number of muscles which exist are deemed in excess of those necessary for the actions to be performed, indicating that the reduction of the bones has been much in advance of that of the muscles which were originally connected with these bones, many of which linger behind, as it were, though with new relations and uses, and sometimes in a most reduced and almost, if not quite, functionless condition, and sometimes even with completely changed structure."

As further evidence of the testimony which geology has rendered the theory or hypothesis of transformism, there might be cited the reptilian character of fossil birds which have been found; instance the Archæopteryx. Also the "cloacal animals," the Monotrema, may be mentioned as heralding most important advances, which laid the first foundation of the mammalian class, though on account of the cloaca these animals are distinguished from all other mammals, but which on the other hand makes them agree with birds, reptiles, and Amphibia,—in fact, with the lower vertebrata. "The formation of the cloaca consists in the last portion of the intestinal canal receiving the mouth of the urogenital apparatus,—that is, the united urinary and genital organs,—whereas in all other mammals (Diodelphia as well as Monodelphia) these organs have an opening distinct from that of the rectum. However, *in these latter also the cloaca formation exists during the first period of their embryonal life*, and the separation of the two openings takes place only at a later date in man, about the twelfth week of development" (Haeckel). In these animals also the collar-bones, by means of the breast-bone, have become united in one piece, similar to the well-known fork-bone in birds. In all other mammals the two collar-bones remain separated in front, and do not fuse with the breast-bone.

In the preceding pages the effort has been to show that there has been diversity or tendency to differentiation from the first, and that also continuously progressive changes in the organic forms have been going on during the whole geologic history of the earth: and now we wish to demonstrate that these changes are similar in a general way to that observed in embryonic development; that the laws of change and the laws of progress are similar in the two cases; that every individual animal body, man included, has commenced just where life upon the earth commenced, from a single cell or spherule of living but apparently unorganized protoplasm; that it has become what it is by adding cell to cell, tissue to tissue, organ to organ, and function to function, thus passing successively through the stages of germ, egg, embryo, infant, youth, to man: and this may be termed the embryonic or *ontogenic series* (individual-making). In the words of Dr. Joseph Le Conte,* we have another series which may be called the natural-history series, or the classification or *Taxanomic series*, relating to science of arrangement. Here we commence with the lowest unicelled microscopic organisms, and passing up the animal scale, we find a series of forms similar to though not identical with the last, but in every progressive division we have added cell to cell, tissue to tissue, organ to organ, and function to function, the animal body becoming in each advance more and more complex in structure, in the mutual action of its correlated parts, and the mutual action with the environment, until we reach the highest complexity of structure and of internal and external relations only in the highest animals.

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* "Evolution and its Relation to Religious Thought."

A third series the same author has given us, which he calls the geological or *Phylogenic series*, commencing with the earliest organisms,—the very dawn of life, in the very lowest rocks,—and passing onward and upward through the Eozoic, Palæozoic, Mesozoic, Cenozoic, to the Psychozoic or present time; first the lowest forms, and then, successively, forms more and more complex in structure, until we reach the most complex internal and external relations, and therefore the highest structure, only in the present time. This the author (Le Conte) deems the most fundamental of the three series, because it is the *cause* of the other two. He says we have here a recognition of *progressive change* in organic forms throughout geological times,—first the reign of protozoa, then of mollusks, of fishes, of reptiles, of mammals, and finally of man. In the early Palæozoic times there were no vertebrates, but never were mollusks of greater prominence; their size, number, and variety, in the absence of competition, gave them a monopoly of power. In the latter Palæozoic time (Devonian), fishes were introduced; they grew rapidly in size and importance, until finally, through competition and change of environment, the Mollusca sought safety in a less conspicuous position. Reptiles and amphibians in the Mesozoic time became prominent not only on the land but in the seas and in the air, swimming and flying reptiles holding high carnival long after mammals which were small in size and low in type made their appearance; but when conditions became favorable for their development they rapidly increased in number, size, variety, and grade of organization, and quickly overpowered the great reptiles, which rapidly sank into a subordinate position. Finally, in the Quaternary, appeared man, contending doubtfully for awhile with the great mammals, but in time (Psychozoic) acquiring mastery through superior intelligence. The huge and dangerous mammals were destroyed, the useful animals and plants were preserved and made subservient to his wants. In all cases it will be observed that the rulers were such because, by reason of strength, organization, and intelligence, they were fittest to rule; so "the race has not been to the swift nor the battle to the strong," but to the fittest.

(To be continued.)

ADENOID GROWTHS, MOUTH-BREATHING, AND THUMB-SUCKING IN THEIR RELATION TO DEFORMITIES OF THE JAWS AND IRREGULAR TEETH.

BY NORMAN W. KINGSLEY, D.D.S., NEW YORK, N. Y.

(Concluded from page 366.)

I HAVE given the first case in this series (Figs. 1 and 2, page 17) a great deal of thought in both the presence and absence of the patient for more than a year, and I am unable to come to any conclusion which will satisfy my own mind as to the real cause of the deformity.

In this case we have mouth-breathing, an adenoid pharyngeal growth, a prominence of the superior incisors, an excessive elongation of the molars and bicuspids, with a normally broad palate and not a high vault.

It is easy enough to say that the deformity of the dental arch was due to the mouth-breathing and that the mouth-breathing was the result of the adenoid hypertrophy ; but in the first place I know of no proof that the growth in the pharynx antedated the mouth-breathing or was the cause of it. We only infer that the growth caused the mouth-breathing because, when removed, the mouth-breathing ceased. We are told that the mouth-breathing dated from birth, but it was not until some years afterward that the adenoid growth was discovered.

It is most natural to suppose that with the two existing, the pharyngeal growth was the cause of the other ; but in this particular case it is by no means proven, nor are we called upon here to account for the origin of the mouth-breathing. It is sufficient for us to discover, if we can what possible relation there was between this abnormal respiration and the coincident abnormal arch.

None of the arguments which have ever been made, so far as I have read, to show the connection between mouth-breathing and a deformed dental arch, apply in this case. It has been said that mouth-breathing produces a narrowed arch and a high vault ; but here was neither a narrow arch nor a high vault, and not even in those cases where narrow arches and high vaults were found coincident with mouth-breathing have I been satisfied with the logic of the arguments. In the case under consideration, the chief deformity lay in a bulging downward of the jaw and alveolar process immediately beneath the antrum, as if the cavity of the antrum had been enlarged in a downward direction, and yet I had no proof that such was the case any more than that the alveolar process had unduly thickened there with the growth of the permanent molars. In conclusion, I can see no possible reason for connecting that particular form of the jaw with a glandular growth in the pharynx, situated some distance from it and having no bearing upon it ; and besides, the abnormality of the jaw continued to increase after the mouth-breathing habit was broken up.

It is easy enough to guess, and easy to speculate, but guesses and speculations are not bases for science.

It is also easy to dismiss the subject by saying that the above-described condition was due to an excessive or abnormal development of the jaw in the molar region, but such a statement, which may be entirely satisfactory to superficial thinkers, is only another form of stating the fact ; it does not reach the origin of the deformity.

In the second case described (pages 102 and 103), the excessive protrusion is the main feature, and here we have thumb-sucking through early childhood, and an adenoid growth discovered later.

It is somewhat difficult to dispel the idea that the long continuance of the thumb-sucking in this case did produce an impression upon the deciduous dental arch which ultimately sent the incisors upon their forward slant. Here, again, is a mouth-breather, but the coincident dental deformity is so entirely different from the former case as to preclude the idea that one and the same cause could produce such entirely different results.

I should without hesitation eliminate mouth-breathing as a factor in this case, and the only tangible cause left is the thumb-sucking habit.

It has so long been held that thumb-sucking does produce deformities like this, that the theory has been accepted without questioning its validity. I myself have fallen into that error (if it be an error) in the past, but I am becoming skeptical. I have seen so many cases of thumb-sucking or its equivalent where no deformity followed, and so many cases of protruding upper jaws where there had been no thumb-sucking, that I am beginning to doubt the relation. The following examples among others will illustrate. A child whom I was seeing daily had been nursed from a bottle with a rubber nipple, and had formed the habit of going to sleep with the nipple in her mouth, and would cry for it until the nurse yielded and gave it to her. I was not aware of this until the child was about four years old, when I saw the four upper incisors protruding, the two centrals very markedly. The rubber nipple was taken away, but very soon the central incisors loosened and dropped out, with their roots absorbed as fully as in the natural course of events they would have been three years later. I was alarmed, and anticipated all the evil results coming from the common belief in the pernicious results of thumb-sucking ; but the permanent incisors did not develop until the normal period arrived, and they and all the other teeth in the jaw appeared in due time, in a perfectly regular dental arch. There is not and never has been the slightest protrusion.

FIG. 35.

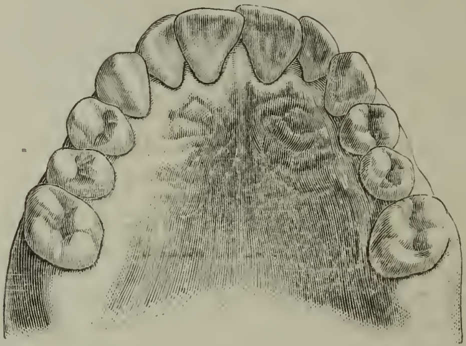
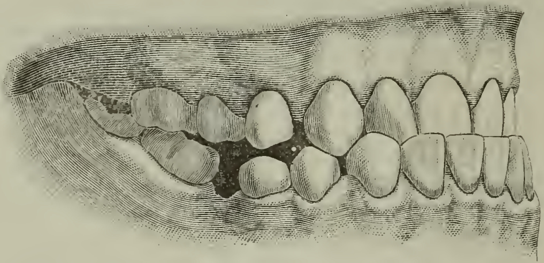


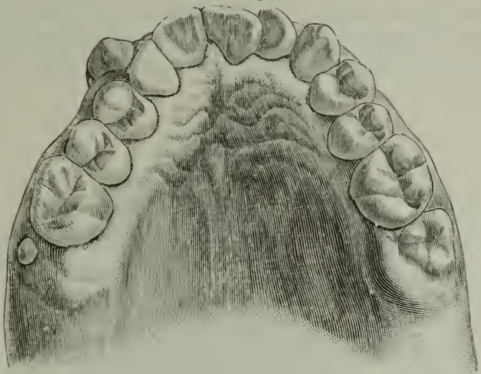
FIG. 36.



Another example is that of a young man of seventeen. He had sucked his thumb until he was seven or eight years of age, and the habit was then broken up only after repeated applications of some offensive mixture upon the thumbs. The model of his upper jaw is shown in Fig. 35. Here is a regular dental arch, a well-formed palate, and a natural pitch to the incisors. The curious part is the occlusion of the jaws; the upper one shuts inside the lower, as seen in the articulated models, Fig. 36.

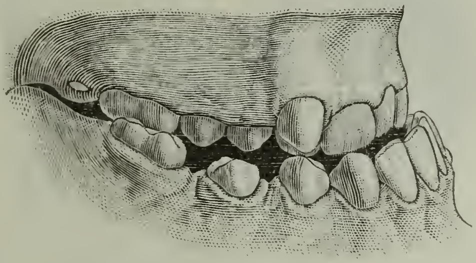
I believe this prognathism to be a peculiarity inherited from the mother, but this is only an inference, as the mother has worn artificial teeth so long that she has forgotten the relations of her natural ones. This lad was quite as persistent a thumb-sucker as the one described on page 102, but the habit does not seem to have exercised any influence upon the upper arch, where a forward movement would have been beneficial.

Fig. 37.



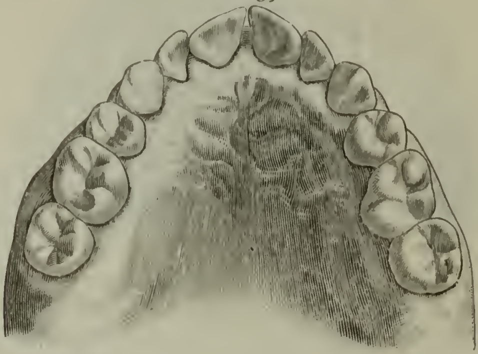
Another case of prognathous jaw, shown in Figs. 37 and 38, is that of a girl thirteen years of age. The mother tells me that the child was nursed from a bottle, and the habit of going to sleep with the rubber nipple in her mouth was not broken up until she was six years of age. In the upper jaw a cuspid has been crowded completely out of the arch, but a study of the case reveals no cause for this condition, particularly if the persistent use of the rubber nipple is accounted to have any effect in enlarging the anterior part of the dental arch. The lower jaw here not only shuts far in advance of the upper one, but there are only two points where the teeth come in contact. It is not necessary to enlarge upon such an extraordinary condition as these two thumb-sucking cases show, which are the very reverse of all former theories.

Fig. 38.



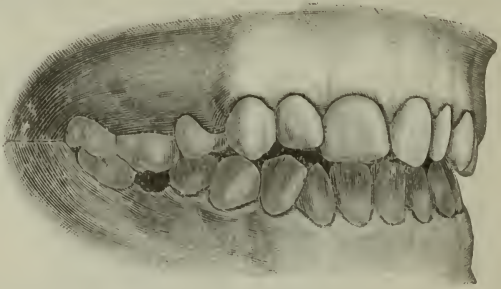
Still another case is shown in Figs. 39 and 40,—a young lady of sixteen. In this case there was slight protrusion, V shape and lapping of the central incisors of the upper jaw. But this peculiarity is unquestionably inherited, as the mother shows the same arrangement of incisors. Except for this slight V shape, the upper jaw is well formed, but the lower incisors are crowded and appear to have been forced back. There is a considerable gap between the upper and lower front teeth when the molars are in contact. She had the habit of going to sleep with two fingers in her mouth, and continued this habit until she was eleven years old. If thumb-sucking (or its equivalent in this case, sucking the fingers) ever produces the effect of altering the shape of the dental arch, we may reasonably suppose that to be the cause of the crowded and retreated condition of these lower incisors.

Fig. 39.



The explanation of the condition seen in Figs. 18 and 19 is easier,—that is, if we can be satisfied with immediate causes. This child inherited an undue prominence of the upper jaw from her mother, and this inheritance was aggravated by the appearance of two additional lateral incisors. We can thus account for a portion of the deformity by the same law that transmits other peculiarities of form and feature; but two things in this connection we cannot account for, viz: the origin of the deformity in the mother, and the appearance of the two extra laterals in the child. It will be of interest also to observe whether the child will transmit to her offspring the tendency to develop four laterals instead of two, should she ever become a mother. We may call this a freak of nature, but who shall say that an entire race may not have come from an initial which at that time was a freak of nature?

Fig. 40.



In the case described on page 361, Figs. 25 to 34, I have never been able to formulate any explanation of its origin. There was no apparent inherited tendency, no thumb-sucking, and no adenoid growth ; nevertheless the discrepancy between upper and lower jaws was enormous. I can only offer a theory : that it was the result of accidental causes occurring at the time of the eruption of the second set, beginning with some slight deviation of occlusion which may have affected the articulation at the condyles, and that in turn aggravating the malocclusion of the teeth. I am quite aware that such a theory will be scouted by Dr. Talbot (*vide* his paper before the New York State Dental Society, 1892), yet in that same paper he says, "I have never been able to 'jump the bite,' although I have tried in a number of cases. I do not believe anyone else has been able to accomplish it, nor do I believe that such a thing is possible."

This is the most extraordinary statement I have ever read from that fertile author, and it argues either that I attempt to impose falsehoods upon my colleagues, or that I *can* accomplish that which Dr. Talbot cannot, and which he believes *impossible* because *he* cannot. It has been done repeatedly by me for more than twenty years, and the great change in facial appearance in the case (Figs. 25 and 32) was due almost entirely to "jumping the bite." A moment's reflection will recall the knowledge to any dentist that the lower jaw can be moved forward or backward on the same plane more than the diameter of a tooth, and this difficulty confronts everyone in making full sets of artificial teeth.

In strongly marked aberrations of development such as have been described in this series of cases, it is desirable to discover a tangible cause, the knowledge of which may be applied in the prevention of similar deformities ; but to seek for the cause of the thousand trifling variations from our preconceived notions of the perfect type of the dental arch would be as useless as to go into the forest and try to explain why every limb took the particular turns and twists which distinguish it from every other limb.

Dr. Ottolengui says, "If it is true that thumb-sucking can cause a protrusion of the *secondary* set of teeth, why does it not produce a similar result with the *temporary* set? How can we suppose that a given amount of pressure can affect the more resistant bone, and not influence the younger mouth of the child with temporary teeth?

"It seems to me that if it is ever true at all that thumb-sucking can cause a protrusion of the jaw, we have it within our means to determine when such a condition has so resulted. If a given case of protrusion is attributable to thumb-sucking, it must of necessity follow that had the child not practiced the habit, the jaw would not have protruded. If this be denied, and it be claimed that the jaw would have been prominent anyway, then it is plain that there must have been some other cause besides sucking of the thumb. Admitting this postulate then, that a thumb-sucker protrusion is where the protrusion has been caused by this, *and by no other cause*, we come to this, that the protrusion has occurred in one of two ways : First, the length of the arch, measured around the circle, has not been enlarged, but the projection has been produced by a flattening of the sides. The length being normal, but simply distorted, it must follow that *such a case could be restored without extracting any tooth*, or in plainer language that by widening the jaw, and reducing the forward prominence, we may attain a normal mouth with all teeth in proper position. The second class of cases is where the length around the arch is increased, thus accounting for the anterior prominence. In such case the pressure would be supposed to have moved the teeth forward, new tissue forming the while. The result would be a normal occlusion from the bicuspid region backward, but a protrusion forward, *with distinct spacing between the teeth.* This, of course, would be another condition which could be corrected without loss of a tooth.

"From these statements I argue that if thumb-sucking ever causes a protruding jaw, *we may exclude from such etiological history all cases where it is absolutely necessary to extract a pair of teeth in order to reduce the arch to its proper proportions with the rest of the head*, not including the lower jaw. By this last I mean that there may be instances where the lower jaw is abnormally small, and a reduction of the upper to meet that would not be the operation which I am considering.

"What then are we to think of those cases of protruding jaws where the overhang is so great that it becomes absolutely necessary to remove a pair of bicuspids in order to reduce the arch to symmetrical dimensions? These are by far the most numerous of the protruding jaws, and therefore worthy of our consideration. Before proceeding, I wish to say that whereas etiology may seldom aid us in the correction of irregularities, I think that the theory of etiology which I am about to advance is one which, if thoroughly appreciated and understood, might help us very much, in that it would tell us at once when to extract, a procedure usually studied considerably before being decided upon.

"To begin at the end, let us suppose a case similar to the one of the boy shown in Dr. Kingsley's models (Fig. 11, page 103). Here we find that after removing the bicuspids the remaining teeth have been formed into a regular arch, and one which is well filled with teeth. From this it *is fair to argue that the size of his teeth was in excess of the normal capacity of the arch exactly equivalent to the width of the two teeth removed.*

"My postulate, then, is that where a child by inheritance or from unknown causes develops a pair of jaws of a given size, and a second set of teeth too large to be received within the jaw, the result must be that the jaw is either increased to accommodate the teeth, or the teeth erupt in abnormal positions, or else, resisting such an impulse, they, or some of them, remain encysted and unerupted. Let us consider the direction in which this enlargement of the arch would occur.

"Fig. 41 shows a superior jaw, in which we find the incisors and molars of the second set in place, the cuspid and two molars of the first set still remaining, and we also see an approximate position occupied by the permanent bicuspids and cuspid. If we observe these three teeth a moment, we see first that each one is, from its shape, itself a wedge, while the three together form also a larger and more powerful wedge. We also observe that they are approaching an orifice which is smaller than the sum of their diameters. Of course these drawings are diagrammatical. They are manufactured, but this is fair, for I have simply produced for you the condition which must have prevailed in the mouth of the boy under discussion, *whose jaw at this age did not protrude in the least.* Moreover, his thumb-sucking habit had been abandoned some years previous.

"I have arranged this, then, as his was, viz: the space to be occupied would just accommodate the cuspid and the second bicuspid, but will not receive all three teeth.

"In Fig. 42 we see the first bicuspid in place, and what is the result? In the diagram we observe that the forward part of the jaw has advanced. Is this what would occur in nature? What else? The advance of the wedge must increase the size of the arch, and no arch can be elongated at its abutments,—in this case the solid bone in the region of the condyles. But supposing for a moment that it be asked, Why could not the sixth-year molar have been pushed backward rather than the incisors forward? The reply is evident: to push the incisors forward is to meet with no resistance equal to that offered by the two molars, one unerupted, but still existent. Secondly, the molars are locked by the occlusion with the lower jaw, which is not true in the incisive region. The result then would be that the anterior teeth would be pressed forward. Here we come to a curious fact, which is that this forward movement of the incisors will not be appreciable till the first bicuspid has descended to a point where it bears upon the roots beside it. Then the action begins, the process yielding and the teeth moving forward, but their apices remaining almost stationary, so that the result is a tipping upward.

FIG. 41.

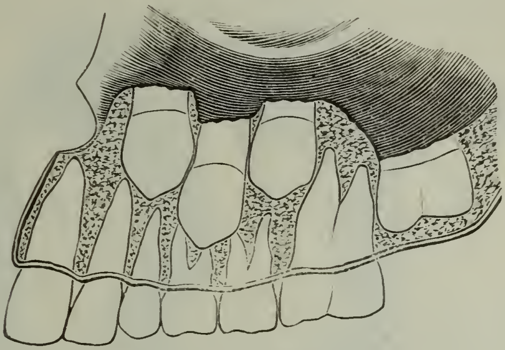
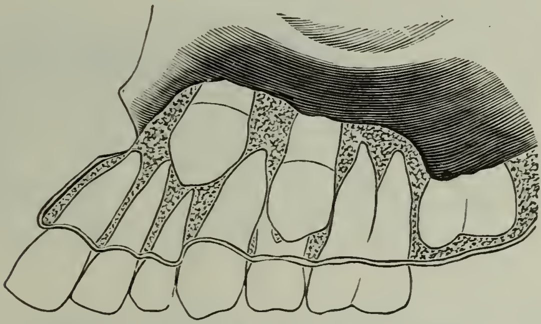


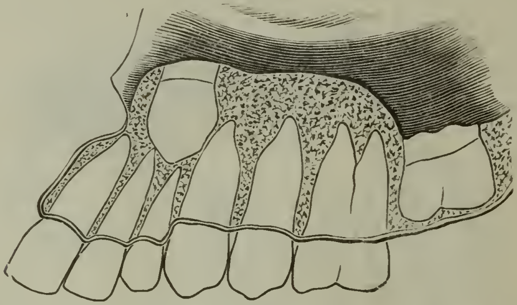
FIG. 42.



"Little if any change occurs with the presentation of the second bicuspid, because the temporary molar has probably occupied as much space as it needs, as seen in Fig. 43. When the cuspid comes down, however, the forward movement is again initiated. In Fig. 44 we see the permanent teeth in position, and note the still greater protrusion of the jaw.

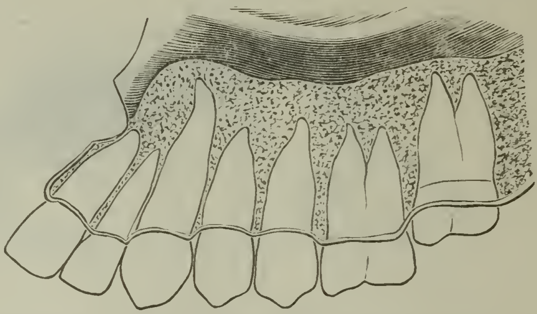
"That I may not be misapprehended, I will call attention to the fact that I claim this to occur only where the teeth are too large for the normal size of the jaw. With normal teeth, the space occupied by the cuspid and molars of the milk set, plus added length of the arch by development, if there be any at this point, would just equal the sum of the diameters of the teeth which replace them. But if we examine one of the bicuspids removed from the mouth of this lad, we note at once that it is as large as many molars. We have here tremendous teeth in a jaw not large enough to accommodate them, though proportionate to the boy's general frame.

FIG. 43.



"This, then, is one possible explanation of a protruding jaw which is otherwise symmetrical. We have other conditions, I think, which are dependent upon the same causes. In fact, the above-described action *would only occur when the bicuspids and cuspid occupied such position in relation to their central diameters that they together would operate as a single wedge.* Such a position is shown in Fig. 45, where the sections of the teeth show that they bind one upon the other equivalently.

FIG. 44.



"In Fig. 46 is a suggestion of the production of an approximate saddle-shaped arch. Supposing that the first bicuspid is in place, if the second comes down relatively as placed in the diagram, it would fall within the arch.

"In Fig. 47 we find the most common result in a crowded jaw. The cuspid, from its peculiar shape, being a double wedge, longitudinally and laterally, if it miss an accurate contact with its neighbors would readily be crowded out of the arch, as seen. Thus the pressure which in the first place causes the forward movement of the teeth would be much less in this instance, if any at all existed. The two bicuspids would occupy the place of the three temporary teeth, the temporary cuspid being lost prematurely because of the absorption of its root by pressure of the first bicuspid. Then, of course, when the cuspid comes in as what is popularly termed a "tush," the wise dentist explains that its malposition is due to the fact that the temporary cuspid was prematurely lost, whereas the converse is true, and the temporary cuspid was lost because of the position of the permanent successor. The correction of these cases is exactly similar to that of the prominent jaw. The first bicuspid must be sacrificed to allow the approach of the cuspid. This one fact shows that it belongs to the same class of cases, having a similar etiology, as I have suggested.

FIG. 45.

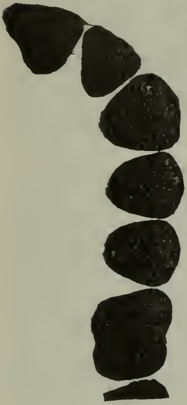


FIG. 46.

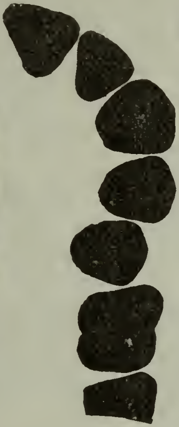


FIG. 47.

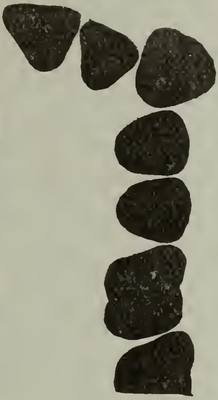
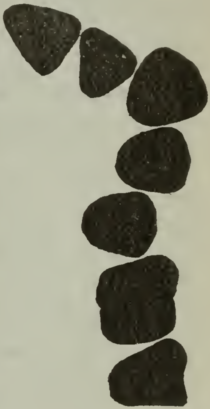


FIG. 48.



"Fig. 48 shows an arrangement by which protrusion is entirely avoided, whilst identical causes give us the typical saddle. The three teeth under consideration having missed contact which would keep them in place in the arch, the second bicuspid appears within and the cuspid without the curve. Extraction of the second bicuspid would usually be necessary to correct the deformity."

OUR STATE DENTAL LAWS: A HISTORICAL AND COMPARATIVE ANALYSIS.

BY C. B. ROHLAND, A.M., D.D.S., ALTON, ILL.

THE public is the direct, the individual dentist only the indirect beneficiary of all dental legislation. Logically, the former should be eager and responsible for dental enactments, and the latter should accept the situation with more or less indifference or reluctance. The reverse, however, is the truth. The dental profession has been practically united in energetic efforts "to regulate the practice of dentistry and protect the people against empiricism in relation thereto." That legislation of some sort is almost unanimously conceded to be a necessity, is evidenced by the fact that forty states and one territory are at this date working under dental laws of more or less efficiency. On this point the profession may be said to be a unit. As to what the provisions of these acts should be, the profession may be said to be any number of units. As many of our state laws are admitted to be very defective, and earnest efforts are constantly being made to amend and improve them, a bird's-eye view of the situation, past and present, may not be without profit as well as interest. The appended analysis is believed to be comparatively free from errors; should, however, any of the reports appear incomplete or at fault, I will be glad, in the interest of historical accuracy, to have them corrected. Pains have been taken, where authorities differ, to verify the points here given by appeals for information to friends and officials on the ground. I wish to express my appreciation of the uniform courtesy and promptness with which my inquiries have been met.

The states and territories are arranged in the chronological order of the approval of their first dental enactments. The subsequent amendments are appended, giving when practicable any material changes made in the original law. This may be of some value as showing the change of sentiment in each locality. It must not be forgotten, however, that the statute signed by the governor does not always exactly represent the sentiment of the majority of the profession. The law enacted often differs very materially from the law asked for. So many objections must be removed, and objectors placated, that the enactment after it has passed through the legislative mill is frequently only an emasculated compromise.

As will be seen, Alabama heads the list chronologically as well as alphabetically with the first dental law ever passed in this country, and, as far as I can learn, in the world. Singularly enough, the question which set the whole profession by the ears but a few years ago, and which has not yet been fully settled, seems at that time to have been no question at all. It was taken as a matter of course that dentistry was a branch of medicine, and the medical boards of the State were called on "to examine and license applicants to practice dental surgery under the same rules and regulations and subject to the same restrictions as those who apply for license to practice medicine"; and it was further made the duty of the medical boards to "add, where the same is practicable, to their body, by election, a professional dentist having the requisite qualifications." When practicable, mark you! This was section 1 of the law, which was entitled "An Act Regulating the Practice of Dental Surgery, and for other purposes." Sections 2 and 3 imposed fines and penalties for attempting to practice without a license, but, as has been done even in these latter days, it was expressly provided that the act should not be construed so as to prevent regularly licensed physicians and surgeons from practicing dentistry. This act remained on the statute-books for forty years, in a state of more or less innocuous desuetude, when in 1881, the dental profession feeling able to manage its own affairs, another law more in harmony with present conditions was enacted. It would be interesting to know what the provisions of the medical practice act were at that time, for the existence of medical boards, recognized by law, presupposes a law creating them, but I have been unable to learn anything about it. The present medical practice act of Alabama, which was enacted in 1877, four years before the law of 1841 was repealed, and which is still in force, put the machinery of the law in the hands of boards of censors, created by the state and county medical societies. Diplomas under this law confer no right to practice medicine, but are a prerequisite to examination by county boards. The state board alone examines new graduates.

For twenty-seven years Alabama was the only state in the Union that could boast a dental law, when New York, in 1868, passed "An Act to incorporate Dental Societies for the Purpose of Improving and Regulating the Practice of Dentistry in this State." Ohio followed a close second, one month later, with "A Law to Regulate the Practice of Dentistry in the State of Ohio." The New York scheme, however, though an elaborate one, simply provided for the formation of state and district societies, substantially as organized at present, conferred corporate privileges upon them, and gave the state society power to grant diplomas. Restrictive legislation really only began, in this state, eleven years later, with the law of 1879. Ohio's law, although incomplete and inefficient, contained within it the germ of the majority of subsequent dental enactments, a license to practice, based on a successful examination, being required for non-graduates. There was no examining board created, the state society and local auxiliary societies issuing licenses on examination, graduates not being required to apply for either license or registration. With the exception of the incorporation of the Kentucky State Dental Association, February 18, 1870, nothing further was done in the way of dental legislation, until Georgia flocked in all by itself in 1872. How the ball was then set rolling, until but four states, Montana, Nevada, Wyoming, and Idaho, remain without the fold, is told in the appended analysis. It is confidently expected that one or more of these will join the procession before long. Acts and amendments are pending in a number of legislatures which may change the situation in places, at any time.

In giving Kentucky fourth place chronologically, it is but fair to say that the date claimed and usually accepted as the date of incorporation of the state society, is February 6, 1868, which, if correct, would entitle her to second place. This claim would seem to be supported by the wording of the law of 1878, which describes itself as "An act to amend an act entitled an act to incorporate the Kentucky State Dental Association, approved February sixth, one thousand eight hundred and sixty-eight." No such measure, however, appears of record as having been approved on that date. The original act incorporating the Kentucky State Dental Association, so far as examination of the records discloses, bears date February 18, 1870. As the act of 1878 is, with the exception of one word, identical with the act claiming to be the act of February 6, 1868, which also styles itself "An act to amend an act entitled an act to incorporate the Kentucky State Dental Association" (see American System of Dentistry, vol. iii, p. 991, also pamphlet, "To the Dental Profession of the State of Kentucky,—Law Relating to Dentists"), the inference is justified, that the date appearing in the act of 1878 was an error, either of the author or the enrolling clerk, and that dental legislation in Kentucky began with the act of incorporation bearing date February 18, 1870.

The year 1887 was the most prolific in dental enactments. Eleven legislatures brought in six new states and amended five of the old laws. Next comes 1891, with two new states and six amendments to its credit, followed by 1885, with six new states and one amendment.

Where the authority to grant license is vested in a board, it is put down as an examining board with the number composing it following. Though the title varies in some of the states, its functions are the same. New York, for instance, has a Board of Censors, Rhode Island a Board of Registration, and New Jersey a "State Board of Registration and Examination in Dentistry." In all but three states an examining board is created by law, the exceptions being (1) Missouri and (2) Nebraska, which impose on their county clerks the duty of seeing that licenses are duly issued to holders of diplomas from "reputable colleges," the clerk, who is never a dentist, or (possibly) even the son of a dentist, of course being the judge of what constitutes a reputable college, while (3) Connecticut gets along without any authority at all, it apparently being everybody's or nobody's business to see that the law is respected. However inadequate a law framed after the Missouri and Nebraska idea would seem to be, it is but fair to say that both states report the law as fairly well observed, and as having been productive of much good. The state society in Missouri, in the absence of a board, has made it its business to see that the law is enforced, and through its efficient law committee has demonstrated that even an incomplete law is better than no law at all, providing it be intelligently administered. Nebraska is by a constitutional provision prohibited from creating any new boards, unless formed out of other state officers, which accounts for and at the same time excuses her for having accepted such a statute as late as 1887.

As to the number of dental boards, most states are content with one consisting of from three to eight members. West Virginia, however, cannot get along with less than four, one for each congressional district; while unlike some of our pessimistic and belligerent friends, who are inclined to consider the average dental examiner as simply an egotistical nuisance with more or less harmful proclivities, Texas dotes on them, and rejoices in the possession of forty-seven boards, one for each judicial district. As there are three members to each board, it takes just one hundred and forty-one examiners to satisfy the needs of the Lone Star State, which never does anything by halves. As the law says the judge of each judicial district shall appoint the board, "which shall be composed of three reputable dentists residing in said district," but fails to define just what is meant by "reputable," it would be interesting to know what standard of reputability the average Texas judge may consider just the thing among dentists.

In twenty-one states the governor appoints the board on his own responsibility. In six the governor appoints and the state society nominates, and in eight states the state society elects. Indiana divides the appointments, giving the governor 1, board of health 1, and state society 3. West Virginia, for some occult reason, imagines its board of public works best fitted to judge the qualifications necessary in a dental examiner. The first twelve states to regulate the practice of dentistry put the appointment of the board into the hands of the state society ; the last seven states gave it to the governor.

In twenty-five states, the requirements for license to practice are either a diploma or examination by the board. Add to these the three states where diplomas alone are necessary, and the proportion of states recognizing a diploma as entitling the holder to license is over sixty-eight per cent. Eight states require and admit all to examination. Five states require a diploma or its equivalent as a prerequisite to examination. Two states only recognize by law other state board certificates, Colorado and Connecticut both accepting them in lieu of a diploma.

New York in the twenty-four years since her first dental act was passed has succeeded in persuading her legislature to add to or amend no less than six times. New Jersey, with five years less to work in, and North Carolina with eleven less, each has changed her law no less than three times. The facility with which the profession in these states succeed in inducing the canny rural legislator from the mosquito districts to do their will, even to the extent of passing an iron-clad act longer than the moral law, is calculated to make the profession elsewhere turn green with envy, where years of more or less Machiavellian effort is required to move the stony-hearted Solon.

Twenty-one states in all have succeeded in amending their original laws. An examination of the changes made is interesting.

The requirements in these states were originally as follows :

Dip. or Ex.		*Dip. and Ex.*	*Ex.*	*Dip.*
1. Alabama.	10. Indiana.		1. Florida.	1. Kansas.
2. Kentucky.	11. Mississippi.		2. Colorado.	
3. Ohio.	12. Michigan.			
4. Georgia.	13. Maryland.			
5. New Jersey.	14. Minnesota.			
6. South Carolina.	15. South Dakota.			
7. Pennsylvania.	16. Wisconsin.			
8. New Hampshire.	17. Virginia.			
9. North Carolina.	18. New York.			

At present they are grouped as follows :

Dip. or Ex.		*Dip. and Ex.*	*Ex.*
1. Kentucky.	6. Michigan.	1. New Jersey.	1. Alabama.
2. New York.	7. Maryland.	2. Minnesota.	2. Georgia.
3. Ohio.	8. Kansas.	3. Virginia.	3. South Carolina.
4. Pennsylvania.	9. North Dakota.	4. Florida.	4. New Hampshire.
5. Indiana.	10. Wisconsin.	5. Colorado.	5. North Carolina.
			6. Mississippi.

New York has been classed with those requiring either a diploma or examination. Nominally a diploma is required of all applicants before being permitted to register, but anyone otherwise qualified may appear before the board of censors for examination. Instead of a certificate, the successful applicant receives a diploma conferring the degree of M.D.S., which entitles to registration. What this examination amounts to, may be inferred from the result of the examination in May last year, when out of thirty-one candidates but eight passed.

As no law can be enforced without funds, columns have been arranged, showing what provision the law makes for fees, and the disposition of fees and fines. This, however, only indicates what the law says or does not say. Where it is silent, it is put down as having made "no provision." In such cases the boards often construe the silence of the law liberally, and exact such fees as in their judgment may be necessary. Georgia, for instance, requires a fee of ten dollars from all applicants. The same obtains also under the head of compensation. Many of the laws fail to say anything about compensation to the board for their services, but in most cases it is construed to include all necessary expenses, the term "necessary expenses" having a more or less elastic signification according to the state of the treasury. Delaware seems to be particularly hard on its servants, the board. The law, while utterly failing to provide sufficient means to carry out its own provisions, obliges the board at all times to meet within fifteen days at the call of any one person desiring to be examined. Fortunately, Delaware is a small state, traveling expenses there are in proportion, and applicants few, else a plethoric purse would be a *sine qua non* to official position. Where the law expressly mentions per diem, mileage and expenses, the actual situation may be no less deceptive, for unfortunately almost without exception it is expressly stipulated that in no case "shall any of the salary or other part of the expenses of the board ever be paid out of the state treasury." In consequence of which proviso, in a majority of the states, the members of the boards go down in their pockets for the privilege of serving the dear people. In the matter of compensation Colorado easily stands at the head for liberality,—on paper,—as the board is authorized to fix its own compensation. It is only limited by the amount in sight. Unfortunately the wail goes up in Colorado, as in less favored states, of an insufficiency of funds. In my own state, Illinois, "five dollars per diem and expenses" sounds reasonable enough perhaps; but as a matter of fact, in the entire history of the board the first per diem has yet to be paid, to say nothing of individual expenses, which so far, except a trifling amount, have been borne by the members themselves. However, this dwindles into insignificance beside the record in New York, where the machinery of the law is put into the hands of the dentists themselves, and they assume the responsibility of seeing it enforced. With three thousand registered dentists, the largest organized body of the profession in the Union, and undoubtedly the wealthiest, and with "one of the best laws in the country" on its statute-books, as it claims, the chairman of its board of censors was obliged to advance in the neighborhood of seventeen hundred dollars in two years' time to meet necessary expenses, and the report of May, 1891, showed a balance of nearly six hundred and fifty dollars still due! Who will say, in the face of such records all over the country, that dental laws are a species of class legislation framed for the special profit of the individual dentist!

Three states have an annual registration fee,—Minnesota and Wisconsin each one dollar, North Dakota two dollars. The reports show the value of this feature, North Dakota alone showing but a slight deficiency and that due to the payment of back indebtedness.

Among the curiosities of dental legislation may be mentioned that Florida, Iowa, Mississippi, and West Virginia stipulate that "this act shall not be construed to prevent any person from extracting teeth," to the end no doubt of encouraging and improving prosthetic dentistry. Georgia, Mississippi, New Hampshire, and North Carolina, among others, expressly exempt graduates in medicine from the provisions of the dental law. That is to say, between the D.D.S. and the M.D. wishing to practice dentistry in either of these states, the former must pass an examination, while the latter seems to be exempt. Verily, in these states, medicine, in the eye of the law, is a bigger thing than dentistry.

North Carolina loyally comes to the front, and declares the war is over and that "no one shall be denied a license on account of race, color, or previous condition of servitude."

Michigan, mindful of the proximity of Canada, only permits one hundred dollars over expenses to remain in the hands of the treasurer of the board. Any accumulation over that amount the state appropriates, and further emphasizes her distrust by fixing the bond of the treasurer at one thousand dollars!

South Carolina thinks the patient should have a chance to come back at the dentist and prove himself the victim of malpractice, and so decreed in section 7 of the act of 1875 that "every dentist in this state be required to keep a record of all cases treated in his practice, in accordance with a form to be designated by the South Carolina State Dental Association, and furnish his patient with a copy of the same when so desired by the patient."

Connecticut has the shortest law, there being but one hundred and thirty-nine words divided into two sections,—the first stating who may not lawfully practice, and the second upholding the majesty of this little "seven-by-nine" act by making violations, misdemeanors, and imposing fines upon conviction of not less than fifty nor more than two hundred dollars for each offense.

New Jersey, after a careful survey of the situation, for the purpose of fully explaining things and covering every point it can possibly think of, goes to the head of the class with a cast-iron law of just two thousand seven hundred and seventy-two words, divided into twelve sections, filling four pages of the DENTAL COSMOS in old-style brevier type. Minnesota gets along with about four hundred and fifty words less, but divides them into seventeen sections. North Dakota has a law of about the same length, and among some other very sensible provisions decrees that the secretary "shall receive a salary which shall be fixed by the board," in addition to his expenses.

Michigan by amendment lately has made its university the standard of recognition for other colleges. The significance of this lies in the fact that the dental department requires three full terms of nine months each. Diplomas from colleges requiring less are not recognized.

New York reports the largest list of registered dentists, about three thousand. Oklahoma the smallest, eighteen.

It is gratifying to note that although dental laws have been on our statute-books for a quarter of a century, and within the past twenty years have been frequently and bitterly assailed, they have been universally sustained by the courts. The principles involved have been upheld again and again by decisions from our highest tribunals. But one, the New Hampshire act of 1878, was pronounced unconstitutional by the Supreme Court of that state, owing to one of its provisions which made an unjust distinction between persons of the same class, but the validity and desirability of dental legislation were again distinctly affirmed. The profession in New Hampshire accepted the situation, and had a new law passed which so far has not been questioned. Should it be, it is safe to say it will be sustained as all the rest have been.

No.	STATE.	YEAR.	AUTHORITY.	HOW APPOINTED.	REQUIREMENTS.	FEES.	FEES AND FINES. WHERE ASSIGNED.	COMPENSATION.
1.	ALABAMA.	1841, Dec. 31.	Medical Boards.		Same as for license to practice medicine.	No provision.	Fines, half to informer, half to county.	No provision.
		1881, Feb. 11.	Ex. Board, 5 members State Society.	State Soc.	Dip. or Ex.	L. and Ex., $5; L. on Dip., $0.	Fees to Board; fines to State.	No provision.
		1887, Feb. 28.	Ex. Board, 5 members State Society.	State Soc.	Ex.	L., $5.	Fees to Board; fines to State.	No provision.
2.	NEW YORK.	1868, April 7.	Ex. Board, 8.	State Soc.	For State Soc. Diploma, a New York Dip. and Ex., or 4 years' study and Ex., or in practice prior to this act and Ex. No license to practice required.	State Soc. Dip., $20; Cert. of Qualification, $10.	Dip. Fee to State Soc.; Cert. Fee to District Soc.	No provision.
		1870, April 21.			For State Soc. Diploma, a New York Dip. and Ex., and State Soc. empowered to confer with Diploma degree of M.D.S.			
		1879, June 20.			For license to practice, Dip. or Ex., and Cert. of Registration.	L. on Ex. (Soc. Dip.), $20; L. on Dip., $0; Cert. of Reg., additional, 50 c.	Dip. Fee to State Soc.; Cert. Fee to county clerk; fines to school fund.	No provision.
		1881, May 26.			Privilege of registration under provisions of previous act extended 60 days from date.	L. on Ex. (Soc. Dip.), $20; L. on Dip. $0; Cert. of Reg., 25 c.		
		1888, May 10.			Extends prohibition to practice to employees, and defines more fully methods of registration.	Cert. of Reg., 50 c.		
		1889, May 31.			Dip or Ex., and must be 21 years of age, and register.	Cert. of Reg., 50 c.	Doubles fines for second offense.	
		1892, ——					Fines to Soc.	

3.	OHIO.	1868, May 8.	Ex. Board, 5.	State and local Societies.	Dip. or Ex.	No provision.	Fines to school fund.	No provision.
		1873, March 10.	Ex. Board, 5.	State Soc.	Dip. or Ex.	No provision.	Fines to school fund.	No provision.
		1892, April 7.	Ex. Board, 5.	Governor.	Dip. or Ex.	Ex., $10; L. on Dip., $2.	Fees to Board; fines to school fund.	$5 per diem and 3 c. mileage.
4.	KENTUCKY.	1870, Feb. 18.	Act incorporating State Soc., and creating the Board of Censors.					
		1878, April 8.	Ex. Board, 3, and Pres. and Sec'y State Soc.	State Soc.	Dip. or Ex.	L. not to exceed $20.	Fees over expenses to State Soc.; fines to school fund.	As by-laws of State Soc. may provide.
		1886, May 10.	Ex. Board, 3, and Pres. and Sec'y State Soc.	State Soc.	Dip. or Ex., and registration.	L. not to exceed $20.	Fees over exp. to State Soc.; fines to sch. fund.	As by-laws of State Soc. may provide.
5.	GEORGIA.	1872, Aug. 24.	Ex. Board, 5 members State Society.	State Soc.	Dip. or Ex.	Ex. no provision; L. on Dip., $0.	Fines, half to informer, half to school fund.	No provision.
		1879, Oct. 20.			Provides for registration, and makes violations misdemeanors.			
		1885, Oct. 9.	Ex. Board, 5 members State Soc.	State Soc.	Ex.	No provision.	Fines, half to informer, half to school fund.	No provision.
6.	NEW JERSEY.	1873, March 14.	Ex. Board, 5 members of State Soc.	State Soc.	Dip. or Ex.	L., $30.	Fees to Board; fines, half to informer, half to school fund.	$10 per diem.
		1880, Feb. 17.	Ex. Board, 5 members of State Soc.	State Soc.	Dip. or Ex., and registration.	L., $30.	Fees to Board; fines, half to informer, half to school fund.	$10 per diem.
		1884, March 27.	Ex. Board, 5 members of State Soc.	State Soc.	Dip.	L., $30.	Fees to Board; fines, half to informer, half to school fund.	$10 per diem.
		1890, April 7.	Ex. Board, 5.	Gov., on recommendation of State Soc.	Dip. and Ex., or 5 years' study and Ex.	L., $25.	Fees to Board; fines, half to Board, half to State.	5 c. mileage and expenses.
7.	S. CAROLINA.	1875, Feb. 23.	Ex. Board, 5 members of State Soc.	State Soc.	Dip. or Ex.	L. and Ex., $15; L. on Dip., $0.	Fees to Board; fines to school fund.	No provision.
		1887, Dec. 19.	Ex. Board, 5 members of State Soc.	State Soc.	Ex.	L., $15.	Fees to Board; fines to school fund.	No provision.

No.	STATE.	YEAR.	AUTHORITY.	HOW APPOINTED.	REQUIREMENTS.	FEES.	FEES AND FINES. WHERE ASSIGNED.	COMPENSATION.
8.	PENNSYLVANIA.	1876, April 17.	Ex. Board, 6.	State Soc.	Dip. or Ex.	L. and Ex., $30.	Fees to State Soc.; fines to poor fund.	Expenses.
		1883, June 20.			Provides for registration.	L. and Ex., $30; L. on Dip., $0.		
9.	NEW HAMPSHIRE.	1878, Aug. 6.	Ex. Board, 3 members of State Soc.	State Soc.	Dip. or Ex.	L. and Ex., $5; L. on Dip., $1.	Fees to State Soc.; fines to State.	$5 per diem and expenses.
		1891, April 7.	Ex. Board, 3.	Governor.	Ex.	L., $5.	Fees to State; fines to State.	$5 per diem and expenses out of fees.
10.	N. CAROLINA.	1879, March 7.	Ex. Board, 6 members of State Soc.	State Soc.	Dip. or Ex.	No provision.	Fines to school fund.	No provision.
		1887, March 3.	Ex. Board, 6 members of State Soc.	State Soc.	Dip. or Ex., and registration.	L., $10.	Fees to Board; fines to school fund.	Expenses.
		1889, Feb. 25.	Ex. Board, 6 members of State Soc.	State Soc.	Time of registration under previous act extended 12 months from date.	L., $10.	Fees to Board; fines to school fund.	Expenses.
		1891, March 3.	Ex. Board, 6 members of State Soc.	State Soc.	Ex.	L., $10.	Fees to Board; fines to school fund.	Expenses.
11.	INDIANA.	1879, March 29.	Ex. Board, 5.	State Soc.	Dip. or Ex.	L. and Ex., $25.	Fees over expenses to State Soc.; fines to school fund.	As by-laws of State Soc. may provide.
		1887, June 28.	Ex. Board, 5.	Gov'r, 1; B'd of Health, 1; State Soc., 3.	Dip. or Ex., and registration.	L. and Ex., $5; L. on Dip., $1.	Fees to Board; fines to State.	As by-laws of State Soc. may provide.
12	LOUISIANA.	1880, March 10.	Ex. Board, 5 members of State Society.	State Soc.	Dip. or Ex.	L., $0; Ex., $0.	Fines, half to State Society, half to school fund.	No provision.
13.	WEST VIRGINIA.	1881, Feb. 21.	Ex. Board, 3 for each of the four Congressional districts.	Board of Public Works.	Dip. or Ex.	L. and Ex., $6.	Fees to Board; fines to State.	$2 for each examination.
14.	ILLINOIS.	1881, May 30.	Ex. Board, 5.	Governor.	Dip. or Ex.	L. and Ex., $2; L. on Dip., $1.	Fees to Board; fines to school fund.	$5 per diem and expenses.
15.	MISSISSIPPI.	1882, Feb. 25.	Ex. Board, 5.	Governor.	Dip. or Ex.	L. and Ex., $5; L. on Dip., $2.	Fees to State Society; fines to State.	As Soc. may provide.
		1890, Feb. 21.	Ex. Board, 5.	Governor.	Ex.	L., $5.	Fees to State Society; fines to State.	As Soc. may provide.

16.	IOWA.	1882, March 2.	Ex. Board, 5.	Governor.	Dip. or Ex.	L. and Ex., $2; L. on Dip., $1.	Fees to Board; fines to State.	$5 per diem.
17.	VERMONT.	1882, Nov. 29.	Ex. Board, 5.	Governor.	Dip. or Ex.	L. and Ex., $5; L. on Dip., $0.	Fees over exp. to State; fines to State.	$3 per diem.
18.	MISSOURI.	1883, April 2.	Clerk of County Court. City Register for St. Louis.		Dip.	L., $1.	Fees to Clerk of County Court or City Register; fines to school fund.	
19.	MICHIGAN.	1883, June 2.	Ex. Board, 3.	Governor.	Dip. or Ex.	L. and Ex., $10.	Fees over $100 and expenses to State; fines to State.	$3 per diem.
		1891, July 1.	Ex. Board, 3.	Governor.	Dip. or Ex. Michigan University made the standard college, and prohibition to practice extended to students.	L. and Ex., $10; L. on Dip., $3.	Fees over $100 and expenses to State; fines to State.	$3 per diem.
20.	MARYLAND.	1884, March 31.	Ex. Board, 5.	Governor.	Maryland Dip. or Ex.	L., $1.	Fees to Board; fines to school fund.	No provision.
		1886, April 7.	Ex. Board, 5.	Governor.	Dip. or Ex.	L., $1.	Fees to Board; fines to school fund.	No provision.
		1888.	Incorporated into code of public general laws. No material changes.					
21.	KANSAS.	1885, Feb. 25.	Ex. Board, 4.	Governor.	Dip.	L., $10.	Fees to Board; fines to State.	$5 per diem and expenses.
		1887, March 5.			Extends time of registration under provisions of previous act six months from date.			
		1891, March 9.	Ex. Board, 4.		Dip. or Ex.	L. and Ex., $20; L. on Dip., $10	Fees to Board; fines to State.	$5 per diem and expenses.
22.	MINNESOTA.	1885, March 3.	Ex. Board, 5. At least 3 must be members of State Soc.	Governor, from names furnished by State Soc.	Dip. or Ex.	L. and Ex., $10; L. on Dip., $10.	Fees to Board; fines to school fund.	$5 per diem and expenses.
		1889, April 24.	Ex. Board, 5. At least 3 must be members of State Soc.	Governor, from names furnished by State Soc.	Dip. and Ex., or 10 years' practice and Ex.	L., $10; Annual registration, $1.	Fees to Board; fines to school fund.	$5 per diem and 3 c. mileage.

No.	STATE.	YEAR.	AUTHORITY.	HOW APPOINTED.	REQUIREMENTS.	FEES.	FEES AND FINES. WHERE ASSIGNED.	COMPENSATION.
23.	DAKOTA, NOW S. DAKOTA.	1885, March 10.	Ex. Board, 5 members of S. Dakota Dent. Soc.	Governor.	Dip. or Ex.	L and Ex., $10; L. on Dip., $10.	Fees to Board; fines to school fund.	$5 per diem and expenses.
	N. DAKOTA.	1885, March 10.	Ex. Board, 5 members of S. Dakota Dent. Soc.	Governor.	Dip. or Ex.	L. and Ex., $10; L. on Dip., $10.	Fees to Board; fines to school fund.	$5 per diem and expenses.
		1890, Feb. 6.	Ex. Board, 5.	Governor.	Dip. or Ex.	Ex., $10; L., $5; Annual registration, $2.	Fees to Board; fines to school fund.	$5 per diem and salary to Sec'y.
24.	CALIFORNIA.	1885, March 12.	Ex. Board, 7.	Governor.	Dip. or Ex.	L. and Ex., $10; L. on Dip., $10.	Fees to Board; fines to school fund.	Expenses.
25.	WISCONSIN.	1885, March 23.	Ex. Board, 5. At least 3 must be members of State Soc.	Governor.	Dip. or Ex.	L. and Ex., $10; L. on Dip., $1; Annual registration, $1.	Fees to Board; fines to State.	Expenses.
		1887, April 5.	Ex. Board, 5. At least 3 must be members of State Soc.	Governor.	Dip. or Ex.	L. and Ex., $10; L. on Dip., $1; Annual registration, $1.	Fees to Board; fines to State. Violations defined and made misdemeanors.	Expenses.
26.	DELAWARE.	1885, March 31.	Ex. Board, 5.	Governor.	Dip. or Ex.	L. and Ex., $1; L. on Dip., $1.	Fees to Board; fines to school fund.	No provision.
27.	VIRGINIA.	1886, Feb. 26.	Ex. Board, 6 members of State Soc.	Governor, from names furnished by State Soc.	Dip. or Ex.	L. and Ex., $10.	Fees to Board; fines to school fund.	Expenses.
		1890, Jan. 28.	Ex. Board, 6 members of State Soc.	Governor, from names furnished by State Soc.	Dip. and Ex.	L., $10.	Fees to Board; fines to school fund.	Expenses.
28.	OREGON.	1887, Feb. 23.	Ex. Board, 4.	Governor.	Dip. or Ex.	Ex., $25; Ex. of Dip., $5; L., $1.	Fees to Board; fines to school fund.	Expenses.

29.	NEBRASKA.	1887, March 23.	Clerk of County Court.		Dip.	L., $1.	Fees to Clerk County Court; fines to school fund.	
30.	MASSACHUSETTS.	1887, April 1.	Ex. Board, 5.	Governor.	Ex.	L., 50 cents; Ex., $10.	Fees to State; fines to State.	$5 per diem, and 3 cents mileage out of fees.
31.	ARKANSAS.	1887, April 2.	Ex. Board, 5.	Governor.	Dip. or Ex.	L. and Ex., $5; L. on Dip., $5.	Fees to Board; fines to school fund.	$2.50 per diem and expenses.
32.	CONNECTICUT.	1887, April 4.	None.		Dip. or any State Board Certificate, or 6 years' practice.		Fines to State.	
33.	FLORIDA.	1887, June 7.	Ex. Board, 5 members State Society.	Governor.	Ex.	No provision.	Fines to State.	No provision.
		1891, May 25.	Ex. Board, 5 members State Society.	Governor.	Dip. and Ex.	L., $10.	Fees to Board; fines to State.	Expenses.
34.	WASHINGTON.	1888, Jan. 28.	Ex. Board, 5.	Governor.	Dip. or Ex.	L. and Ex., $25; L. on Dip., $2.50.	Fees to Board; fines to school fund.	$5 per diem and expenses.
35.	RHODE ISLAND.	1888, June 1.	Ex. Board, 5.	Governor.	Dip. or Ex.	Ex., $25; L., $2.	Fees to Board; fines to State.	Expenses.
36.	COLORADO.	1889, March 15.	Ex. Board, 5.	Governor.	Ex.	L., $10.	Fees to Board; fines to State.	As Board may determine, and exp.
		1891, April 1.	Ex. Board, 5.	Governor.	Dip. and Ex., or some other State Board Certificate, and Ex.	L., $10.	Fees to Board; fines to State.	As Board may determine, and exp.
37.	TEXAS.	1889, March 27.	Ex. Board, 3 in each of the 47 judicial districts.	District Judge.	Dip. or Ex.	L. and Ex., $5; L. on Dip., $0.	Fees to Board; fines to school fund.	Expenses.
38.	OKLAHOMA.	1890, Dec. 25.	Ex. Board, 5.	Governor.	Dip. or Ex.	L., $10.	Fees to Board; fines to school fund.	$3 per diem and expenses.
39.	MAINE.	1891, March 4.	Ex. Board, 5.	Governor.	Ex.	L., $20.	Fees to Board; fines to State.	Fees for services, and expenses.
40.	TENNESSEE.	1891, March 23.	Ex. Board, 6.	Governor.	Dip. or Ex.	L. and Ex., $5; L. on Dip., $5.	Fees to Board; fines to State.	$5 per diem and expenses.

A PLEA FOR EXTRACTION AND REPLANTATION AS A MEANS OF CURE IN OBSTINATE ALVEOLAR ABSCESS.

BY JOHN S. MARSHALL, M.D., CHICAGO, ILL.

(Prepared for the Anniversary Meeting of the First District Dental Society of the State of New York.)

MR. PRESIDENT AND GENTLEMEN OF THE SOCIETY : I feel greatly honored in being invited to address you this evening, because of the fact that your society is considered to be one of the most progressive and learned bodies in the profession. I am also on this account apprehensive that I may disappoint you in the subject-matter which I shall present for your consideration.

When the invitation was extended to me through a member of your committee, I was requested to name my subject at that time, which I did. The choice was somewhat hastily, but I trust not unwisely made.

In the presentation of this subject I lay no claim to a new discovery, for other men have done the same thing before me, and in excuse I remind you of certain sayings of King Solomon, viz : "Is there anything whereof it may be said, See, this is new ? It hath been already of old time, which was before us." Verily, "there is no new thing under the sun." I trust, therefore, that I shall be pardoned for introducing a subject in this presence which cannot be classed as a new operation or an entirely new method of treatment. Methods, however, are sometimes improved, and I shall be content to leave to your judgment whether the line of treatment to be presently indicated is justifiable and any improvement over the methods generally pursued.

One of the first and most important principles of surgery is the conservation of diseased organs and tissues, provided they can be restored to a healthy condition, rendered more or less useful for the purposes for which they were created, and incapable of harm to the general system.

In these days of antiseptic surgery, many things are accomplished which a few years ago would have been considered impossible. The abdominal cavity is now opened with impunity, and operations made upon the inclosed viscera that, to say the least, are startling. The chest is explored, and portions of the lung removed ; the cranium is perforated, and tumors extracted from the deeper portions of the brain, and yet the individuals operated upon live to tell the tale.

In no department of minor surgery has greater advancement been made than in dentistry. Most of the diseases of the mouth and associated parts are now more successfully managed, and thousands of diseased teeth are restored to health and usefulness every year that were formerly consigned to the forceps, and this has been largely the result of a better knowledge of how to prevent and to combat the inflammatory processes by antiseptic methods.

I was led to adopt the practice of extracting and replanting teeth for the cure of obstinate alveolar abscess on account of the failure—at my own hands and those of others—to cure a considerable percentage of these cases by the ordinary means at our disposal.

By obstinate alveolar abscess I mean those cases of alveolitis in which the inflammatory symptoms persist after all the ordinary means of disinfecting and filling the root-canals, etc., have been faithfully tried without avail.

Obstinate alveolar abscess is usually the result of a crooked root or an abnormally small root-canal, making it impossible in either case to remove or render innocuous the retained septic material ; or perforations of the root made in attempts to open small root-canals ; or erosion of the apical end of the root ; or the presence of broaches, filling-material, or dressings which have passed the apical foramen ; and accompanied by a more or less persistent discharge of pus, either through the external or internal plate of the alveolar process, or through the alveolus at the neck of the tooth. Occasionally cases will be found in which no discharges are present, but instead, a chronic induration of the surrounding tissues, or, as in the superior teeth, the discharges may find their way into the antrum of Highmore or the anterior nasal passages, and possibly mislead the surgeon. These teeth are usually sooner or later condemned as worthless members of the body, and are removed.

It is this class of teeth for which I make my plea, and I believe, from a practical experience extending over a period of several years with this method of treatment, that a majority of them may be rendered healthy and useful for an indefinite period.

It is perhaps hardly necessary to say that replantation is only admissible in the anterior teeth, including the bicuspids. The molars are capable of being replanted only in exceptional cases, when there is fusion of the roots and they assume a conical form, and occasionally a lower molar, where the roots are perpendicular to the crown.

I think it will be generally conceded that attempts to cure *in situ* such cases as those just mentioned usually prove unsuccessful, and that eventually the teeth are lost. This, I believe, results from the fact that such operations are largely, *per force*, only guesswork. If the root is curved more or less acutely, it is difficult and often quite impossible to follow the canal with the broach ; or if the canal is abnormally small, the finest broach may not enter it at all. Drilling is unsafe ; and under these conditions the various antiseptics and liquid filling-materials are unsatisfactory, because they do not always penetrate to the end of the canal, and consequently septic material remains in the root and keeps up a constant irritation.

In cases of erosion of the apical end of the root, amputation of this portion *in situ* is rarely successful in curing the disease, owing to the difficulties in soothing the stump and perfectly filling the apical foramen. The same may be said of attempts to plug perforations of the sides of the roots.

In those cases where broaches, filling-materials, or dressings have passed the apical foramen, diagnosis is difficult except by trephining the alveolar plate, and this has no advantage over extraction and replantation.

Roughened surfaces and foreign substances are not kindly borne by the tissues which surround the roots of the teeth. It is therefore imperative that all such hinderances to a return to a normal condition be reduced to a minimum.

For these reasons it would seem preferable to extract and replant such teeth if they do not speedily prove amenable to treatment by the usual methods ; for, with the tooth in the hand, the root can be minutely inspected and any eroded portion amputated, and the surfaces finely polished. The root-canal can be reamed out and cleansed without fear of perforating its sides, the canal filled and the apical foramen, or a perforation plugged with gold and carefully finished, and the whole thoroughly sterilized.

None of these operations are possible with the same degree of perfection while the tooth is *in situ;* they must be more or less imperfect; and just in that degree will they produce irritation, and the more serious inflammatory processes.

The question might very properly be asked, Are the operations of replantation and transplantation of freshly extracted teeth having the pericementum attached, founded upon physiological law and sound surgical principles? I answer, Yes: quite as much so as are the operations of skin- and bone-grafting, and no one condemns these. Union with the tissues with which they are placed in contact is the result of the same vital processes; the surgical conditions are nearly identical in each of them, and success is as certain in the one as in the other, provided the same aseptic conditions can be maintained until union is complete. Failure of replanted teeth to unite with their alveoli is much less common than with transplanted and implanted teeth; at least my personal observation bears out this statement. The immediate cause of failure in replanted, transplanted, and implanted teeth is usually suppurative inflammation, induced either by mobility of the tooth which constantly breaks up the attachment of the plastic exudate, or septic conditions of the tooth or its alveolus at the time of the operation or inoculation; afterward from a filthy condition of the mouth.

The failures which occur later, viz: after attachment has taken place, are more difficult to understand. In these cases the surfaces of the roots are attacked by the osteoclasts and gradually honeycombed; or masses of tissue are dissolved at various locations, leaving large cavernous excavations with sharp edges; suppuration accompanies or follows the work of the osteoclasts; the tooth becomes loose, and is sooner or later expelled from the jaw as a foreign substance.

In explanation, I would venture the opinion that these phenomena are due to irritation induced by a septic condition of the dentine, resulting from decomposition of the organic material contained in it, and in the form of a gas or effluvium it penetrates the cementum, and, coming in contact with the pericementum and surrounding tissues, sets up this retrograde metamorphosis.

There are certain individuals for whom it would not be wise to undertake the operation, viz: those suffering from general anemia, tuberculosis, and syphilis. Such people are never good subjects for surgical operations, as their tissues are very irritable. They do not as a rule heal readily, and are prone to suppuration and sloughing, consequently replantation, transplantation, and implantation, if performed upon such persons, are likely to prove unsuccessful.

Many of the failures from these operations that have come under my notice have been associated with one or the other of these diseases. Great care should therefore be exercised in the selection of the cases upon which to operate. Carelessness in this regard can only result in failure.

Of the more than twenty operations which it has been my privilege to perform, it has not thus far been my misfortune to be obliged to record a single failure, although they have comprised all grades of the disease,—several of long standing, and ranging in duration from a few months to fifteen years. But I refrain from mentioning individual cases, for fear of wearying you.

We are all no doubt interested to know the character of the union which takes place between the root of the replanted tooth and its alveolus, but so far it has not been positively demonstrated. I would therefore like to offer a few thoughts which I trust may tend toward the elucidation of this question.

Applying the methods employed in physical diagnosis to these cases, we find that percussion gives the most marked signs. Taking the percussion-note of normal teeth, produced by striking the tooth with a steel instrument, as the standard of pitch, we find that as inflammatory conditions of the alveolus advance the percussion-note becomes lower and duller, while, on the other hand, as these symptoms subside the note assumes a clearer and higher pitch. This lowering of the tone is doubtless the result of a thickening of the pericemental membrane, and its increased vascularity.

The percussion-note given by a large percentage of replanted teeth a few months after the operation, or when union is complete, is much clearer and higher pitched than that of the adjoining teeth. This is more noticeable in the superior than in the inferior teeth, on account of the greater resonance of the superior maxillæ.

These facts would seem to indicate that a bony union takes place in these cases between the root and its alveolus. It would also seem probable that the locations at which this ankylosis would most likely occur would be where the pericementum had been destroyed, or the cement-tissue partially removed, and I can see no reason why under these conditions union may not take place in the same manner as with fractured bones. In other cases the percussion-note is normal. This would indicate a normal reunion of the pericementum with the alveolus ; but when the percussion-note is lower and duller, it would be certain evidence of an indurated pericementum, or other inflammatory symptoms.

In conclusion, let me emphasize the following points as necessary to insure success in these operations :

First, exclude anemic, tubercular, and syphilitic cases.

Second, secure thorough aseptic conditions of the surfaces of the root and pulp-canal, by washing and immersing in bichloride of mercury solution 1 to 500 of water.

Third, amputate and smooth all eroded surfaces, but sacrifice as little of the pericementum as possible. This is very important.

Fourth, hermetically seal the pulp-canal and apical foramen, and any perforations that may exist, with gold fillings.

Fifth, curette the abscess-cavity, remove the blood-clot from the alveolus, and wash both with the bichloride of mercury solution before replanting the tooth.

Sixth, secure immobility of the tooth by a ligature or an interdental splint, until union has taken place.

CONGENITAL ABSENCE OF TEETH IN A SUBJECT TWELVE YEARS OLD.

BY V. JARRE, M.D., PARIS, FRANCE.

(Read before the "Société de Stomatologie" of Paris, October, 1891.)

THE patient who exhibits the dental aberration herein described is a lad, twelve years old, with no history of antecedent peculiarities. The dental system in particular is normal in all the members of his family. His only brother, eleven years old, is strong and well constituted.

The mother of the patient stated that she had had a normal pregnancy, but the child at birth was thin and very small, presenting, according to the parents' statement, only a few very fine, whitish hairs, but was unfortunately not weighed at that period of his life.

The child was nursed by his mother, but instead of normally increasing in form and size like children at the breast, he remained thin and miserable, with a loose skin, wrinkled like that of aged people.

At the age of three months the child was suddenly seized by a violent attack of convulsions, accompanied by complete loss of consciousness. This attack lasted about six hours; then all the symptoms disappeared, without apparently interfering with his future state of health.

Up to the age of fifteen months nothing unusual occurred; at that time, however, there appeared in the superior maxilla, on the left side of the median line, a first tooth. This organ, according to the statement of the parents, had the form of a small cone (conoidal or caniniform tooth).

Four months later a second tooth appeared in the same maxilla, but on the other side of the median line, of the same form and size identical with the first one.

Finally, at the age of twenty-three months, a third tooth erupted in the place which is normally occupied by the right superior lateral incisor, and presented also a conoidal form similar to that of the two preceding ones.

Since the appearance of the last, which gives a total of three teeth only, no teeth appeared until the age of three years, so that during that time the inferior maxilla remained absolutely without teeth.

Toward the third year, and without any change taking place in the teeth which appeared in the anterior part of the superior maxilla, two new teeth appeared at the back part of the same maxilla; these teeth were situated one on the right, the other on the left, presenting the size and form of the second temporary molars; they are in place to-day, and will be referred to later on. Through this new eruption the total of existing teeth in the mouth was increased to five, which all occupy the superior maxilla.

Up to the age of seven years no other dental changes took place in the mouth of the patient. Between seven and eight, the teeth situated in the anterior part of the mouth were shed one after the other, and according to their order of eruption; at the same time three new teeth made their appearance in the same places and same order, presenting in each instance the conoidal form of the first one (Fig. 1).

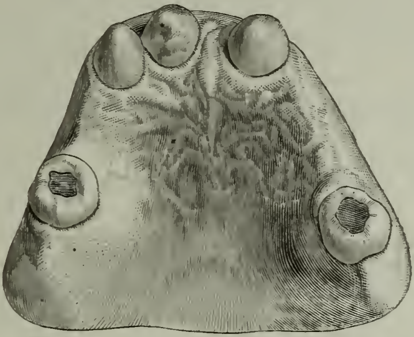
The two other teeth, described as present in the superior maxilla at its posterior part, have not been replaced, and are still in position.

An examination of the case shows the two maxillæ to be regularly developed.

The inferior maxilla is completely edentulous, and presents a ridge along the maxillary border of about seven millimeters in height, reminding one of the jaw as seen in the new-born (Fig. 2).

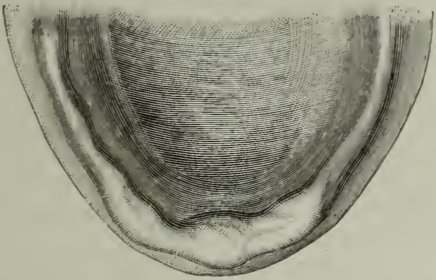
The superior maxilla presents a total of five teeth. The three anterior conoidal teeth, of which two are on the right and one on the left of the median line, are, as seen in Fig. 1, long and voluminous. The posterior teeth each present a deep carious cavity on the masticating surfaces. On examination, both visual and digital, of the alveolar border of the two maxillæ, it is impossible to recognize the least trace of projection that might indicate the presence of future erupting teeth.

FIG. 1.



This arrest of development of the organs of mastication seems to correspond with a number of other peculiarities which are important to note.

FIG. 2.



We have said that at the time of birth the patient was thin and ill developed. He has never since reached the rounded form of children of his age. The skin, in the regions of the forehead and eyelids, is loose and wrinkled ; the nose is flattened transversely and pointed at the end ; the lips are pinched and thin. This association of characters gives to the lad a physiognomy which resembles that of old people, and which contrasts with that of his brother, who is eleven months younger than he, and whose face, full and rounded, appears one-third larger than that of the patient under consideration. The skin of the palmar region is hard and wrinkled; the same with that of the feet, the plantar surfaces of which present callosities at the points on which the weight of the body rests.

The hair, which has already been alluded to, was at the time of birth exceptionally scanty, and has not developed much; the scalp can readily be seen under it. On the rest of the body no hairs are found.

This fact of extreme rarity of the hair coincides with the congenital absence of a great number of teeth, and is in accordance with the general law of correlative variability admitted by Darwin. We know that in certain animals this law is fully confirmed; for instance, in certain races of dogs, the nude dogs, an almost total absence of hair corresponds to a very reduced dental system. The teeth of the domestic hog diminish in volume in direct ratio to the disappearance of the hair, as a result of domestication, while in those hogs which have become free and wild again the hair and teeth return to their normal form and quantity. In man this relation between the two systems, dental and hair, is far from being constant. One even occasionally observes a sort of compensation, a balancing between the two systems. Dr. Magitot, in his work on hairy men, mentions six observations in which individuals having a highly-developed system of hair at the same time presented a very reduced dental system.

In the case under consideration, the nails present certain peculiarities. They are covered with white opaque spots and streaks, which occupy the whole thickness of the tissue and have been observed by the parents ever since the child was born, the spots appearing notwithstanding the constant growing of the nails.

As this description indicates, we have had to deal with a disturbance in nutrition, involving not only the dental system, but also all the tissues of the same order, tissues having their origin in the external blastodermic layer, and which certain authors, as de Blainville, call phanères, by Charles Robin called products.

We must note, in passing, that the crystalline lens, which is also a product having the same origin, does not seem to suffer any appreciable nutritive alterations. The intelligence of the patient compares favorably with that of any person of his age.

In a word, the teeth, the nails, the hair, have been influenced in their nutrition, but the dental organs have suffered the most. The inferior maxilla presents no teeth. Of the five teeth which are found on the superior maxillary bone, the three anterior have been subjected to a retrograde metamorphosis which has transformed them into a form which is most often found in inferior vertebrata; finally, the two posterior ones have not been replaced.

Now, if we confine ourselves to phenomena relating to the dental system only, we must remember that examples of numerical reduction of teeth, which have been observed by authors, apply principally to an absence of one or several teeth, yet examples of individuals who have never had any teeth have been mentioned by different authors, as Dantz, Fox, Sabatier, Fauchard, and others; but their observations do not present sufficient guarantee of authenticity, and M. Magitot, in his book on anomalies of the dental system, considers them as unreliable. It is understood, of course, that in this consideration we exclude similar cases resulting from serious pathological lesions of the maxillæ which have brought about a total absence of teeth or even of the follicles in very young subjects, as such cases are purely of a pathological nature and not of a teratological one.

As a result of our researches, we think we may be able to conclude as follows:

1. That to our knowledge, there exists no real authentic case of congenital absence of teeth in man.*

2. That the case of the patient described, who has never had any teeth in his inferior maxilla and has had only a total of eight, including both temporary and permanent sets of the superior maxilla, of which five were temporary and three permanent, which latter replaced the three temporary teeth which were shed, is an exceptional one.

3. That this example of the reduction of the dental system coincides with a lack of development in the hairy system, and is in accordance with the law of correlation of Darwin.

4. That this arrest of development having not only shown itself in the dental and hairy systems, but also on other dermo-epidermic products of the same origin, denotes a fault of nutrition having deeply involved the derivatives of the external blastodermic layer, known as phanères or products.

METHODS OF FILLING TEETH.†

BY RODRIGUES OTTOLENGUI, M.D.S., NEW YORK, N. Y.

(Continued from page 386.)

SPECIAL PRINCIPLES INVOLVED IN THE PREPARATION OF CAVITIES AND IN THE INSERTION OF FILLINGS.

In the earlier portion of this work I have given what I termed "general principles" in relation to the preparation of cavities and the filling thereof. I now purpose to take up specifically a sufficient number of typical conditions, so that with the description of methods necessary, the student may have the theoretical knowledge which will enable him intelligently to undertake whatever may come into his hands.

In the first chapter I classified cavities as being of three kinds, viz: approximal, crown, and surface, the latter including palatal, lingual, labial, buccal, and festoon cavities. Of these terms, all serve well enough, with the possible exception of the word "crown." Strictly speaking a tooth is divided into crown, neck, and root, so that *any* cavity might be considered a "crown cavity" provided it did not reach or pass the neck. But this use of the word is arbitrary, for the common meaning of "crown" is "the topmost part," "the summit." Thus the "crown of the head" is the extreme upper surface. This latter application of the term has been made by many when speaking of cavities in the masticating surfaces of molars and bicuspids. In the absence of a universally adopted term applicable to this position, the words "crown cavity" in this work must be interpreted to mean a cavity in the masticating surface of a bicuspid or a molar.

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*During the discussion which followed the reading of this paper, Dr. Hugenschmidt mentioned the existence of another authentic case of total congenital absence of teeth, observed by Professor S. H. Guilford, of Philadelphia, and published in the DENTAL COSMOS, March, 1883.

† Copyright, 1891, by Rodrigues Ottolengui.

Approximal Cavities.—Of all cavities, those in the approximal surfaces usually demand the greatest skill and care. Situated most often in a position inaccessible because of the contiguity of the adjacent tooth, a spreading, or separation of the teeth, becomes necessary. Even after this is done, it not infrequently occurs that what would be an easy filling with ready access, becomes exceedingly difficult because of lack of space in which to work. Add to this the tenderness caused by *any* system of wedging, and approximal cavities become, of all, the most to be dreaded by patient and operator. They usually have their initiation at the point of contact. Two teeth touch each other at a limited area, and caries begins at that spot. After spreading the teeth, and removing stains, there is seen at this point of contact a whitish, or chalky, appearance to the enamel. Except in its most incipient form, it is futile to attempt to remove this by filing or by polishing. The caries usually penetrates very deep in proportion to its circumferential area, and the dentine is swiftly reached. To eradicate the caries with the file or disk would be to expose the dentine, and at all events to destroy the integrity of the abutments of the arch by producing a space, which is almost always mischievous. The best plan is to accept the condition, as a cavity needing a gold filling. I am speaking of permanent teeth, and advise gold in all teeth at all ages, where these minute cavities are discovered.

FIG. 110.

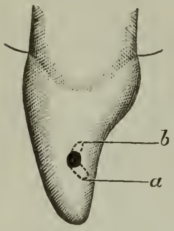


FIG. 111.

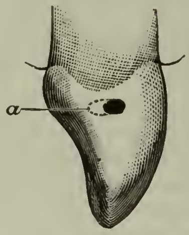


FIG. 112.

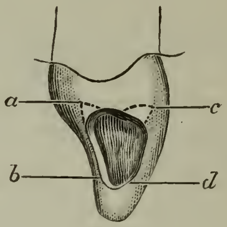


Fig. 110 shows such a cavity in a central incisor. It should be prepared with as little extension of the borders as possible, although making it a point to remove all carious material until strong edges are reached. There is a temptation in these cases toward enlargement, because of the fact that by so doing the work is rendered more easy. The excuse, however, is insufficient, and the practice reprehensible. Indeed, with me it has been my pride to make perfect fillings of the most minute kinds, and under the most trying circumstances. To retain the filling, a rose bur may be used, dipping slightly toward the gingiva as indicated at *b* and similarly toward the incisive edge as at *a*. Here at once we find a difference between "general principles" and "special cases." I have in a former chapter argued that no undercutting should be toward the incisive edge, or at least that it should not be extensive. But in these tiny cavities, where there is strong tooth-substance in all directions, we may allow ourselves the most convenient method and arrange the retaining points opposite to each other as indicated. Even in these tiny cavities I require two extensions of the cavity for good retention ; yet again this is a rule with an exception. Should the cavity occur nearer the neck of the tooth, in the bulbous portion of incisors, or in a cuspid or bicuspid, in either of which there is considerable tooth-substance laterally from labial to lingual aspects, and should there be very limited space in which to work, it may often be both permissible and advantageous to form the cavity as a single deep pit. Fig. 111 shows such a condition in a cuspid, the dotted line *a* showing the inner extension toward the palatal aspect.

In filling these cavities with gold, I follow strictly the rule previously advanced, to place in a cavity only pellets which will pass the orifice without compression. I therefore prepare special pellets, tiny in size, and use sometimes as many as a dozen or more for a filling which when finished is no larger than the head of a small pin. Thus I am satisfied that I obtain as perfect a filling as when the cavity is larger and therefore easier.

Fig. 112 shows the opposite extreme, and we have the largest approximal cavity possible in a central incisor, without encroaching on either the palatal or labial surface. The preparation of this and of all cavities between it and the one in Fig. 110 comes immediately under the rule as already described in connection with Figs. 2 to 8 inclusive. To fill with gold, the first pellet should be placed in the palato-gingival extension at *a*, and should be fixed so firmly that the second and all subsequent pellets may be added without tipping out. The filling should be first extended along the palatal groove in the direction of *b*, great care being observed that this palatal edge shall be perfectly covered. Next, gold is carried toward and into the labio-gingival extension at *c*, after which the completion follows naturally, the labial edge being covered last, and the last pellet of gold being placed at *d*. If this be analyzed, it will be found that I have here followed the general and most valuable rule, "*Fill that part of the cavity first which is farthest from you.*" If we may fill teeth by rule at all, I should say that this one axiom has been of greater benefit to me in practice than any other in the whole realm of dentistry. Its no less important corollary is, "*Where two approximal cavities, adjacent to each other, are to be filled, fill that one first which would be least accessible were the other tooth non-carious.*"

In Fig. 113 we see a large approximal cavity which encroaches upon the labial surface. Under ordinary circumstances this should give the operator little or no trouble. In addition to the space obtained by the wedging, the fact that a part of the labial surface is absent furnishes an abundance of space in which to work. Yet the mistake should not be made that the cavity itself affords sufficient space without wedging. In a few instances this may be true, but more frequently a filling so placed when completed, though it may look perfect to the eye of the patient, would not prove to be so if examined by an expert. The palatal border would show defects, and it is because gold must be builded over this palatal border that more space must be obtained than is furnished by the loss of tooth-substance. To arrange such a cavity so as to retain a filling is readily accomplished, except where the pulp is nearly approached, a condition which renders more difficult the preparation of any form of cavity. Deep extensions are to be made at *a* and *b*, the labio-gingival and the palato-gingival angles of the cavity. These, where it is possible, should be deep enough to hold the filling of themselves. A slight groove should extend along the palatal portion *c*, but care should be observed at this point. It should be neither too deep nor too near the pulp, nor too near the edge of the cavity. Its object is not so much to add to the retentive strength of the cavity as to facilitate the packing of the gold, when the points at *a* and *b* having been filled and connected, we come to extend the gold along this portion. If there be a slight groove we avoid tipping. At *d*, which is toward the incisive edge, we avoid anything in the nature of an undercut, but it is wise to produce a well-marked concavity which will serve as a counterpoise to the upper retainers. Along the labial border *e* there should be no grooving, or undercutting of any kind. Such a procedure only undermines the enamel, producing a weak edge with probable fracture during the operation, or at least the production of a crack which will later bring the tooth back to us with an imperfection at this point. No strength whatever is gained for the filling, so that nothing but mischief can accrue.

To fill this cavity with gold, the first pellet is to be placed in the palato-gingival extension *b*, which should be so formed that it will hold it without tipping. I anneal this pellet and mallet it to place. It should be large enough to be readily wedged to place. The succeeding pellets should be small enough to reach their predecessors without compression, and each should be malleted thoroughly. The correct shaping of a retaining point is rendered futile unless the filling be solidly packed into it. Otherwise, though it may retain what is in it, it will fail to retain the bulk of the filling to which it should lend strength. From the palato-gingival extension proceed toward the labio-gingival pit *a*, and when both are thoroughly and solidly filled, proceed to cover the palatal groove *c* and the cavity-edge at this point. Here it will be wise to use hand-pressure for a brief period. With this milder force pack the gold along the groove and over the edge until a thin layer reaches the incisive concavity at *d*, when the mallet may be resumed. In this way we avoid fracturing the palatal edge by saving it from direct contact with the mallet-stroke. From this point on, the only care needed is to constantly bear in mind the rule, to fill the part farthest from us first, being sure that it is made full enough. Otherwise we find the filling pitted when we come to polish it.

FIG. 113.

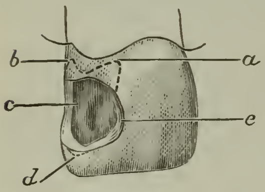


FIG. 114.

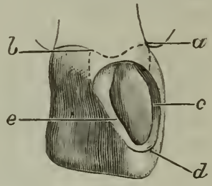


FIG. 115.

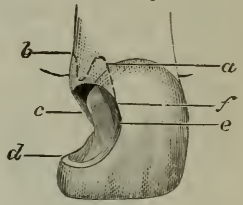


Fig. 114 is the direct opposite of the last, and yet there are points of similarity which some do not note. The approximal cavity here encroaches upon the palatal surface. Where the loss of the labial surface simplifies the operation, the absence of a part of the palatal surface greatly complicates it. There is a curious fact to be observed here. Whereas many look upon the cavity shown in Fig. 113 as one which easily retains a filling, some are much disturbed by the cavity in Fig. 114. The first, apparently, is safe, because a filling will not jump *up* toward the labial aspect, whilst, *per contra*, gravitation may have a tendency to cause a filling to drop *down* and out at the palatal opening. Those who argue thus are deceived into this error of judgment by the fact that when the cavity is seen the patient is in the recumbent position, which makes the labial side of a tooth *up*, and the palatal side *down*. It should be remembered that when the patient is standing erect there is neither up nor down to this condition, and therefore whatever arrangement will retain a filling in a labio-approximal cavity will serve equally well in a palato-approximal one. Consequently the formation of the two classes of cavity are similar, though not identical. We have the same extensions at *a* and *b*, the same groove at *c*, the same concavity at *d*, and the same absence of undercutting at *e*. But we find that *c* and *e* have changed places in the two illustrations. In the previous one *c* represented the palatal part, whereas now it becomes the labial. A similar change occurs in placing the gold. The first pellet is to be placed in the labio-gingival extension, and, after the palato-gingival retainer has been connected with it, we then follow along the groove, which here is at the labial instead of the palatal border, so that we practically reverse the order of procedure. Yet really we do not, for now we are using a mirror, and in the reflection this labial groove, though actually nearer to us, *appears* to be farthest from us, and in this instance we must fill by appearances. If the operator is not skilled enough to use the mirror, he then tips the chair back and lowers his head, so that in that position the labial groove becomes really the farthest point from his vision.

In Fig. 115 we see a cavity which is practically a combination of the last two. We have presented an approximal cavity in a central incisor which encroaches upon both the labial and the palatal surfaces. Where these cavities are extensive, as pictured, they are usually trying. The question has been raised by some authorities as to whether or not the whole corner should be removed. I have already sufficiently expressed my own views upon this. If in either of the previous two cases we gained anything by the presence of the labial or palatal wall which remained intact, what are we to do here in the absence of both? In each of the other cases I argued that the groove which I advocate is not for retention, but to facilitate filling. Consequently, in the present instance, when both walls are absent, we may still feel safe with precisely the same arrangement,—labio- and palato-gingival extensions at *a* and *b*, a slight concavity at *d*, and a groove as before. The question now arises, Shall this groove be placed at the labial or at the palatal border of the cavity? The answer indicates the method of proceeding with the filling, for the groove is only intended as a leading gutter for the gold as we pass from the gingival toward the incisive portion. In this instance we place the groove along the palatal border *c*, for that becomes the distant portion, and must be filled prior to the labial.

I have said that this arrangement will be safe, but it will be so only so long as the natural corner remains intact. Elsewhere I have said that the filling must be so strongly anchored above that, in case of subsequent loss of the natural corner, a gold substitute may be built on without removal of the original filling. To accomplish this the labio- and palato-gingival extensions must be made as deep as possible with safety, and must continue as deep grooves toward the incisive end, relatively about as far as *f* on the labial aspect and *c* at the palatal. The upper half of the filling is thus securely held in three directions, the palatal, the gingival, and the labial.

In filling, after connecting the upper retainers and building along the palatal border into the incisive concavity, care must be taken to restore the lost palatal wall before attempting to fill the main part of the cavity. In plainer language, manipulate the gold so that presently the cavity, partly filled, will appear similar to that in Fig. 113, where, the palatal wall being intact, I said the filling becomes simple and easy. If another method be pursued and the whole of the cavity be floored over first so that it is lined with gold, we but add to our work, for we simply reduce the *size* of a difficult cavity without altering its *shape*. When half completed, the continuance will be more difficult than the beginning, whereas in the method which I advise we constantly lessen the task, making the cavity simpler and simpler as *we continuously alter the shape*. But even by this method only the most skillful operator can have a perfect filling when he has placed the last pellet along the labial border *e*, so that the work seems ended. Examination of the palatal surface of the filling with a mirror will almost invariably disclose the fact that the young operator has not made the filling full enough, or the surface solid enough, to allow for perfect contour after polishing. It is therefore essential for beginners, and wise for older men, to examine this aspect of the filling before removing the dam. Usually gold must be added and contour filled out. In fact, it should be the rule to polish all fillings before removal of the dam, except where in special cases a sufficient reason appears for finishing the filling at a subsequent sitting.

Next we must consider labio-approximal and palato-approximal cavities of another class. Fig. 116 shows a labio-approximal cavity which differs from that seen in Fig. 113 in that the caries has removed the enamel as far as the cutting-edge, along the labial border. This is a rare condition, but is seen occasionally.

The preparation of this cavity is practically similar to that of Fig. 115. The filling must be retained from above. Here, however, it is impossible to make an incisive concavity at *d*, because of the absence of the labial plate. It is undesirable to form an undercut at this point, and we should also abandon the groove along the palatal border below *c*, but it may be made along the labial border *e* with some advantage. Unless the palatal plate be excessively weak, it is seen from the foregoing that I should not remove it. It will serve as a protection to the filling during mastication, relieving it from the strain that would endanger the contour filling which would result were this part of the tooth sacrificed. At the same time the filling must protect it also, as well as be protected by it. To accomplish this, the extreme cutting-edge should be removed, as shown in the illustration, so that the gold may be built over it, thus protecting it from the antagonism of occlusion. No special directions are needed for the packing of the gold beyond the cautions already emphasized to pack solidly, using small pellets, and heavy foil for the final portion.

Fig. 117 shows a palato-approximal cavity similar to the last, in that the depredation reaches the cutting-edge. This is one of the most trying cavities that can be presented, and one, too, which occurs with unpleasant frequency. To remove the labial plate would be to simplify matters vastly, but if such a procedure was wrong in the last cavity, it would be doubly so in this. In the former instance the retention of the palatal plate gave only an added support to the gold, whereas here the labial plate not only serves the same purpose, but *it also covers and hides the gold from view.* An extensive filling of this nature may be placed and scarcely be seen from a front view. Wherever there is found sufficient strength, therefore, to this part of a tooth, I should allow it to remain. As in the last case, the cutting-edge should be removed, allowing the gold to be built over it, thus protecting it. But for cosmetic effects only the merest trifle should be taken away, so that barely a line of gold will show from the front. The formation of the cavity is the same as in the last instance, save that the groove now occurs along the palatal border, to avoid weakening the labial plate.

The insertion of the filling will tax the skill of beginners, as it does that of many of mature experience. This is one of those conditions where a judicious alternation of mallet and hand-pressure produces the most satisfactory results. Because of the inaccessibility, and because of the difficulty to see all parts of the cavity, the danger from fracture by the mallet blow is increased tenfold. My habit is to partly condense every piece by hand-pressure before taking up the mallet. Of course this is slow, but rapidity is not invariably preferable. The main point always is to obtain the best result, in safety. If the operator has a chair which will allow him to tip his patient back, so that he can see directly into the cavity, it would be a most advantageous procedure. If not, he must be skilled in the use of a mirror and depend upon it. After filling the labio- and palato-gingival extensions, I should gradually extend the gold toward the cutting-edge, following the groove and covering the whole inner surface with a veneer of gold. Up to this point I should use the mallet but sparingly, but with this protection supplied to the weak wall, the mallet may be used for completing the filling with less fear. A momentary warning, however, against too free a use of hand-pressure! Beware lest in the attempt to conscientiously condense the gold too much force be exerted, and a fracture occur. *More teeth have been broken by hand-pressure than with the mallet.*

FIG. 116.

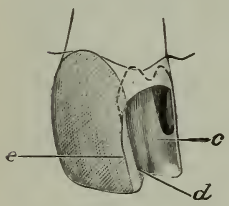


FIG. 117.

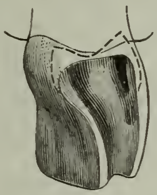


FIG. 118.

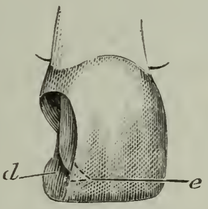
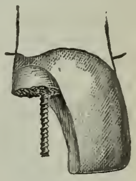


FIG. 119.



Next we reach the condition where the depredation has removed the corner. The restoration of these teeth is classed with contour fillings, but they are also approximal cavities. An important warning is to be given at the very outset. Be sure to obtain sufficient space in which to work. The absence of the corner is apt to prove misleading. Apparently there may be abundance of space, especially where the cavity is extensive. In reality there never is, where the teeth are normally situated, and the neighbor has not been removed. The test will be at the gingiva. Here it will be seen at once that but little space exists between the teeth. Whilst the restoration may be made without separation, the polishing of the approximal surface of the filling must necessarily produce a permanent space. This can be avoided only by spreading the teeth, overbuilding the gold, and polishing so that when completed the original width and shape of the tooth is restored.

In Fig. 118 we see a central incisor from which the corner has been lost. Is any special direction needed for the proper preparation of the cavity? In speaking of the cavities illustrated by Figs. 113, 114, 116, and 117, I have said that the groove at the labial or at the palatal border was less for retentive purpose than for facilitating the operation of filling. In Fig. 115, however, I advised that the upper retaining extensions should terminate toward the incisive edge in grooves which extend about half-way. This was in view of the possible future loss of the corner. Thus it is seen that *though I do not depend upon lateral grooves in the presence of the natural corner, in its absence I do*, more or less. Thus in such a cavity as shown in Fig. 118, after arranging the upper portion as described in Fig. 115, I should continue the grooves toward the incisive region, lessening them in depth and extent until they meet about at *d*. Some dentists make a deep dip inward, that is to say toward the pulp, at this point, endeavoring to obtain a retaining-pit. The result usually is that because of the narrowness of the tooth in this region, this undercutting leaves the labial plate of enamel so thin that the gold is seen through it when the filling is completed. Worse than this, the enamel often appears cracked, and I have seen not a few cases where it has chipped out afterward. Let us consider for a moment what is gained by an extension such as is indicated by the dotted line *e*.

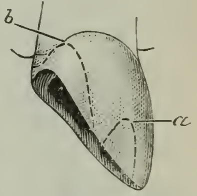
The object of any undercutting is of course to prevent the filling from being forced out of the cavity. Supposing, then, that a strain tends to press the filling out laterally, that is to say toward the adjacent tooth, will this incisive undercut prevent this? If the surrounding wall be quite strong it might have such a tendency, but the real resistance would be found in the palatal and labial grooves, which, *extending the full length of the filling, thoroughly protect it.* The filling will scarcely be movable toward the gingival wall, for there we have the greatest resistance and the best arrangement for retention. Can the filling move downward toward the incisive edge? If so, this undercut might serve. But there is nothing but gravitation to urge such a movement, and that is so slight that the upper extensions are a million times more than adequate. Consequently we find that nothing is gained by the procedure. Is anything lost? *All undercutting which is unnecessary to the retention of a filling is mischievous.* In this instance it would be especially so, since it weakens the incisive end of the tooth, the very point which must sustain the full and first strain of mastication.

It follows, then, that we may depend entirely upon the labio- and palato-gingival extensions, together with the labial and palatal grooving, to retain approximal contours such as shown in this figure.

When the depredation becomes so extensive that the grooves would encroach upon the living pulp, we are compelled to adopt new methods. Fig. 119 shows a cavity of this nature. Strictly speaking, the line of the original pulp-chamber has here been passed, the pulp having receded before the approach of the decay, a common occurrence. Sometimes we may even see the plain outline of what was once the chamber now filled with secondary dentine. To make the lateral grooves here would be hazardous. To arrange the cavity as described in Fig. 115, depending only upon the upper retainers, might prove ineffectual. In this dilemma the screw comes to our assistance, arranged as in the illustration. Up to the point where the screw becomes a necessity there is no imaginable cavity which cannot be shaped to retain a filling, and in teeth from which the pulps have been removed we are seldom driven even to this extremity. I have built down from the gum line complete crowns on centrals, laterals, cuspids, and bicuspids, without resorting to screw or post, and yet have obtained durable (though according to present standards and in the presence of the porcelain crown unsightly) results.

Where we use the screw to retain such a filling as would be needed in Fig. 119, we still have the labio- and palato-gingival extensions, the screw passing upward along the median line. My method of filling is to pack my gold solidly into my upper retainers first, connecting them. Then I drill through the gold thus placed and into the tooth-substance beyond. The drill-hole is then tapped, the screw turned tightly into place, and cut off just short enough not to reach to the line of the incisive edge, after which the filling is completed with small pieces, care being taken to properly surround the screw.

Fig. 120.



In Fig. 120 we have the extreme condition where but one corner is involved. These cases are usually the result of fracture, though they sometimes occur where such a cavity as Fig. 119 has been improperly filled, with the result of subsequent decay and destruction along the incisive edge. As the latter would be the simpler, I will speak only of such as result from accidental blows.

These cases are frequently very puzzling. They most often occur during childhood. When they do, unless the pulp be exposed, as unfortunately sometimes occurs, or unless the pulp should die as the result of the concussion, it is wiser not to attempt any operation at all until the sixteenth to eighteenth year. By that time, especially if the patient be a female, something must be done. Should it be decided to contour with gold, the first step will be to determine whether the two centrals may be shortened with impunity. This often is a material advantage. A case from practice will best illustrate. A patient came to me, a young woman, with two leaky fillings appearing as seen in Fig. 121. The two centrals drooped considerably below the laterals, as often occurs, and I shortened them. After refilling they appeared as in Fig. 122. To return to Fig. 120; should shortening not be desirable, which of course would reduce the condition to an approximation of Fig. 119, we must decide upon an arrangement of the cavity which will retain this unusually extensive contour. In the main this will be the same as in Fig. 119, including the screw, but in addition to this, now that we may reach the opposite side of the pulp-canal we may with advantage form a retaining extension in the direction shown by the dotted line at *a*. It must not be forgotten, however, that there is danger of reaching an elongated cornua of the pulp at this point, and the preparation must be advanced with great caution, extreme sensitiveness being a danger signal not to be overlooked. Although this retainer would be an advantage, it is not a necessity, and should not be obtained at the expense of possible need for destruction of the pulp.

FIG. 121.

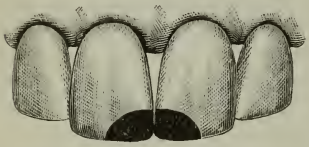
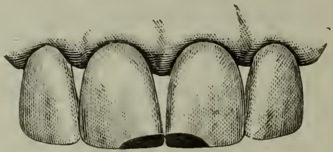
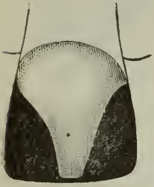


FIG. 122.



Up to this point it is of course immaterial whether the cavities described occur on the mesial or distal surface. In either case they would be treated alike. Should they occur on both surfaces of a tooth, each would be a condition by itself, without relation to the other. There comes a point, however, where approximal cavities occurring on both distal and mesial surfaces of the same tooth do bear a relation to one another, and materially alter the rule of management. Fig. 119 has been introduced to mark the point at which we abandon the sole dependence upon retentive shaping and resort to the screw. Should two such cavities occur in one tooth of nearly the pictured dimension, we would no longer need a screw. Fig. 123 shows such a tooth after the insertion of the filling. It suffices to convey my idea. It is seen that the slight portion of the incisive edge which remained standing has been entirely removed, so that the two cavities become thus united. By this procedure we have a single though extensive cavity to deal with, and the strong retaining powers of the gingival portion of the cavity at each side readily retain the whole mass, operating as they do to counterbalance each other. The cosmetic effect here is better than where an effort is made to preserve the trifling bit of the incisive edge of the natural tooth which remained, so that the arrangement is good both for durability and for appearance.

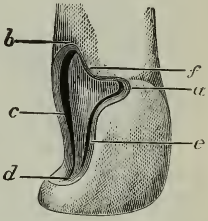
FIG. 123.



An analysis of the directions given up to this point discloses the fact that in every cavity the main reliance for retention is upon the depth and strength of the labio- and palato-gingival extensions. The latter especially is the dependence. In making these extensions we are of course obliged to avoid exposure of the pulp. Therefore they must be made between that organ and the external surfaces, and distant enough from each to avoid disaster. The pulp lies nearer to the labial surface at this part of the tooth than it does to the palatal, for the reason that on the palatal surface near the neck there is a considerable bulge. It is in this thick portion of the tooth that we can anchor many fillings which otherwise would seriously annoy us.

What, then, are we to do with those cavities which present with great depredation about the very part in which these two important anchorages are to be placed? A single example, choosing an extreme case, will serve for all. Fig. 124 shows a central incisor in a condition of almost total wreck. Caries has passed beyond the enamel line and encroached upon the root itself at the neck. It has burrowed along the labio-gingival angle until seemingly there is little hope for anchorage there. It has eaten away a good share of the palato-gingival angle, so that our mainstay in that position apparently must be abandoned. In such an extremity we might hope to depend upon lateral grooves, but here we find that tooth-structure has been lost until we are almost at the plane of the pulp-canal itself. Even what is left of the corner is weak. Yet the pulp is alive, and therefore if it can be filled with gold the tooth perhaps would last longer than were it fitted up with a crown. It can be filled, and well filled, with gold. How are we to proceed in this case? Give attention first to the labio-gingival angle, at *a*. The caries passes as a sort of horn toward the labial festoon. Use first a rose bur as wide as the cavity at *a*, and deepen as far as possible without danger to the pulp. Then with a small bur undercut this place toward the gum and toward the incisive edge. This forms what might be termed a dovetail. I have elsewhere said that I do not connect the labio-gingival and palato-gingival extensions by a groove. That is because ordinarily such undermining would weaken the enamel remaining at this point. Here we find that caries has removed the enamel. The root has been encroached upon. We need no longer dread fracture, since the enamel has vanished, and we may consequently make as deep a groove as possible, from our labial dovetail toward the palatal angle as shown at *f*. Now we reach the palato-gingival angle, or what is left of it. While we cannot get the strong retainer that we ordinarily obtain, yet the bulbous portion of the tooth extends all along the palatal aspect, and much of it is at our disposal. Continuing downward from the gingival groove, we make a deep undercut into this bulbous portion at *b*, and obtain an antagonizing retainer for the labial dovetail at *a*. Next with fine burs cut deep, narrow grooves along the labial and palatal borders, passing just between the pulp and the two outer surfaces, at *c* and *e*. At *d* attempt no more than the usual incisive concavity. I have filled just such cavities as this, where the caries had gone even farther and removed the natural corner. Consequently I know that even here we need no undercut at *d*. Lastly, with a small rose bur, dip the bur-head here and there, in all undercuts, and wherever it can be done with safety. The object is to make the surface of the cavity as rough as possible. If this cavity be filled with quite small pieces, made thoroughly cohesive, and packed carefully into every undercut and roughness, it will be found in place years afterward.

FIG. 124.



I believe I may now pass from the central incisor to other teeth. Of lateral incisors there is little to be said which is not covered by cases in the central. It must be remembered that being a smaller tooth it is frailer, and therefore very deep undercuts are to be decided upon with extreme caution. There is one very odd circumstance that I may allude to. I have noted, after a careful study of the facts, that seemingly the superior lateral incisor is more prone to abscess than the centrals, or possibly than any other teeth at all. I have also come to the conclusion that the pulp of a lateral incisor is less responsive, painfully, than any other. It is more easy to destroy, and more apt to die under a filling. In short, it seems to have less vitality. This leads one to be more cautious in preparing cavities, for it is not at all uncommon to find a pulp exposed after one has begun to place his gold, when the excessive heat of a freshly annealed pellet at last causing pain attracts the dentist's closer attention, and causes him to discover a minute exposure, over which engine-burs and excavators may have passed without remonstrance from the patient. Thus we might easily, through rapid excavation, actually expose a pulp, which accident could have been avoided by more caution, born of the knowledge that lateral incisor pulps are comparatively irresponsive.

In the cuspids we have the same general rules, with one or two notable exceptions. I have argued against any undercutting at the incisive corner of a cavity, and also to some extent against extensive grooving along the labial and palatal borders. This is changed in the cuspid, for here we have proportionately more tooth-substance between the pulp and the outer surfaces. Fig. 125 shows a cuspid having a cavity similar to that in the central in Fig. 115. What was a quite difficult condition in the central is much more simple in the cuspid, so far as preparation of the cavity is concerned. Where it is the distal surface which needs attention, of course the actual filling is more difficult. To form this cavity in the cuspid, we need not make the labio-gingival extension as deep as before, but as there is abundance of tooth-substance at the palato-gingival angle we may, if we desire, make the extension even deeper, though it is rarely necessary. Again, as discretion may dictate, we here may make extensive grooves along both labial and palatal borders, and quite a deep undercut at the incisive corner *d* is permissible where requisite. This last departure from the former rigid rule is allowable, first, because of the excess of dentine in the cuspid beyond that found in the incisors, and second, because the pointed cusp of the cuspid renders fracture of the corner much less liable to occur than in the incisor, which presents a broad, thin incising edge to combat the strain of mastication.

FIG. 125.

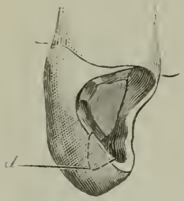


FIG. 126.

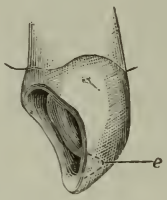
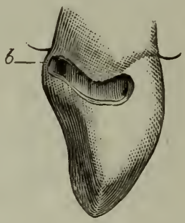


FIG. 127.



In Fig. 126 we see a cuspid needing a contour filling. When I state that I have never seen a cuspid in which I found it requisite to use a screw, it is seen at once that this tooth offers a better field for extensive operations than the incisors. In Fig. 126 the full corner may be safely restored, depending entirely upon the internal arrangements. We make both the labio- and palato-gingival extensions deep. We unite these with a deep groove, for in this tooth we may feel comparatively safe against that fracture of the gingival enamel, which makes the procedure prohibited in incisors. We make strong grooves along both labial and palatal borders, and we make exactly the undercut at *e* which was forbidden in Fig. 118. Indeed, this undercut in the cuspids is mainly the reliance which makes us feel safe without the use of a screw, and it is therefore resorted to in all cases of contour. Thus we find that the cuspid is comparatively easy to work upon. Distal cavities are often troublesome, especially when the condition is what I have called a palato-approximal cavity. If it is found difficult to obtain much separation, which is not at all unusual, the work is sure to be very tedious. Yet even farther back than the cuspid region distal cavities may be made to seem almost like mesial, if the patient be tilted sufficiently to bring the cavity within range of the eye, as is often possible.

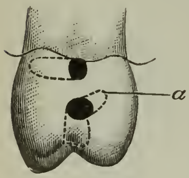
There is one cavity which we sometimes find in a cuspid, to which I may make special allusion. It is shown in Fig. 127, where it is seen to occupy a position along the neck of the tooth just above the bulge of the enamel, and extending around toward the palatal portion. This kind of cavity is most often found where an ill-fitting clasp has been used to retain an artificial denture. Where this is the case, the first bicuspid is commonly absent, which facilitates the operation. But let us suppose that the first bicuspid is not absent, and that the clasp has stupidly been placed between the two teeth, encircling the cuspid. To produce retentive shape, all that is needed is to cleanse out all decay and then undercut along the full extent toward the gum and toward the incisive edge. At the palatal end of the cavity, *b*, make a pit deep enough to hold the first pellet of gold securely ; in filling, use the mirror, and with hand-pressure build the gold from that point well around into the approximal portion. It may then be thoroughly condensed with the mallet, and the filling completed as though only the approximal portion had been involved. Great care is needed to properly polish this filling, because it is above the bulge of enamel.

I may pass now to bicuspids, and at once we approach an almost entirely different field. Many dentists claim that the approximal cavity in a bicuspid, especially in the distal surface, is the most trying in the mouth. Omitting extreme or unusual cases, this is probably true. An evidence of this is the fact that recurrence of decay at the gingival border of fillings is more often found in bicuspids than elsewhere, with the possible exception of molars, which are much the same. This fact is also an argument that such recurrence is rather due to faulty filling than to any idiopathic causes connected with the position, as is claimed by many.

In general, the main difficulty is that it is harder to obtain sufficient space. This is shown readily, for in the absence of the adjacent tooth, even the distal approximal cavity in a bicuspid is really simpler than a similar cavity in an incisor. That this should be so is due to the fact that the bicuspid is a wide tooth, and through a narrow space it is often quite difficult to reach all parts of the cavity. When the bicuspid happens to be unusually long, and the cavity nevertheless reaches nearly to the gum line, the same difficulty is manifestly increased. I have seen teeth of this nature which persistently resisted all efforts to obtain much space, and which, containing extremely large but shallow cavities, became excessively tedious in the filling, because only very small pieces could be properly carried to place. Yet we are told that a steel separator is sufficient for all purposes, and again that a matrix should be placed around all approximal cavities in bicuspids and in molars ! I must give a few illustrations to show the main differences in preparation of cavities, from what has been already said.

In Fig. 128 we see a bicuspid in which I have indicated two small cavities. It is evident that either of these would be simplicity itself in the absence of the adjacent tooth, in which case abundance of space would give ready access. In an ordinary tooth where a fair separation is procurable, either would still be manageable. With inadequate space, and in a wide tooth, either of these will harass both patient and operator if the attempt be made to prepare and fill without extension of the cavity. A pellet of gold crowded between the teeth will be so compressed that by the time it is forced into the cavity itself it is unfit for use, quickly balling up so that it must be discarded. Again and again the same mishap may occur, until it becomes easy to lose patience at the difficulty of filling what from its shape alone should be so simple. But with inadequate space no cavity is simple, and I might almost say the smaller it is the more annoying it will be. Therefore, in such cases I should recommend extension of the cavity to make it accessible. The direction of this extension depends upon the position. It should be toward the labial surface, or the crown, as it happens to be nearer the one or the other. For this reason the illustration shows two cavities, the position of one of which makes extension toward the labial surface preferable, as shown by the dotted lines, whilst in the other I would cut through to the crown. The first practice will be resorted to less frequently in the mesial than in the distal surface, because of the probable showing of the filling. To cut through to the crown will be chosen oftener on either approximal surface. I must pause here a moment to defend this proposition. It has been argued by a skillful operator, and careful thinker and writer, that the crown of a bicuspid or molar should under no circumstances be disturbed in this way. An allusion is made to the similarity here to the strength of an arch. That is, the portion of the tooth which I advise removing, this writer claims is as the arch to the cavity, and its greatest protection. A better argument that he uses is, that it assists in holding together the labial and palatal plates. All of this is beautiful theory ; but to my mind it is illusory, if not false. Given a bicuspid or a molar, sound in other respects, but having such a cavity as the one in Fig. 128 which is nearer to the crown, and the removal of enough tooth-substance to reach the cavity from the crown, as is indicated by the dotted lines, leaves us a tooth with which one could eat for years without fear of fracture *even if it were left unfilled*, imagining for the sake of argument that caries would not supervene. This being, as it is, true, it follows that when protected by a perfect gold filling the tooth will be safe enough. In the last statement I based my argument upon mechanical laws, for the moment forgetting physiological ones, yet it is by physiological laws that the theory of not cutting through to the crown is most easily proven to be fallacious. The whole aim of a filling is to restore the depredations of caries and to prevent a recur-

FIG. 128.



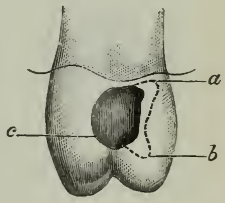
rence. Granting now for a moment that the cavity is better made without cutting to the crown, which of course is true, yet if it cannot be made fully accessible by separating, it will be improperly filled, so that caries, which is not hindered by mechanics, will be sure to recur, and destroy that arch which the operator so thoughtfully preserved. Of course there are men so skillful and so patient that they can make perfect fillings through the narrowest of spaces. But these men are rare, and the best set of principles is that which may be employed by the greatest number.

Now, that I may not be misapprehended, let me state my position once more, succinctly. The borders of a cavity should never be extended when a dentist can by a fair expenditure of time and skill make a perfect filling. However, wherever from lack of space, or other good cause, a perfect filling can be better made by extension of the borders, it may be done, and such extension may be allowed to encroach upon the crown. Indeed, there are cases where there will be no other adequate method of properly retaining a filling, as has been already shown.

Another point is pertinent here. Supposing that such cavities as shown can be filled with amalgam without extension, would that be preferable to extending the borders and filling with gold? I should decide in favor of the gold filling in every instance. *Gold is always preferable to amalgam for durability, wherever it can be inserted producing what we term a perfect filling.* Dogmatic, but true.

The retentive shaping of these two cavities differs somewhat. In the one nearer the crown, very little undercutting should be made along the labial border, but a considerable groove may be cut along the palatal, with a distinct dip toward the gingival corner as indicated by the dotted line *a*. In the other, which after extension will be filled through its labial opening, a moderate groove toward the gum and one toward the crown will suffice. At the palatal end, here the bottom of the cavity, a depression may be made deep enough to retain the first pellet immovable. Either of these cavities, prepared as indicated, becomes simple, and could be rapidly filled with gold.

FIG. 129.



In Fig. 129 we have what may be termed a simple approximal cavity in a bicuspid. It is similar to Fig. 112, where it is shown in a central. Its preparation here is different. We no longer need deep labio- and palato-gingival extensions, nor are we compelled to avoid labial and palatal grooving. In the bicuspid we have simply a cavity surrounded by strong walls. Any antagonizing retaining arrangement will serve to hold the filling in place. The choice, therefore, must depend upon attendant circumstances. Where the adjacent tooth is missing, a moderate groove forming an undercut all around will prove the simplest and best. Where there is an adjacent tooth and we must work at the disadvantage of having the cavity more or less inaccessible, we may best proceed otherwise. The most universally useful arrangement will be as follows: make a palato-gingival extension, not too deep, but shaped so as to restrain the first pellet, as indicated at *a*. Make a similar depression toward the crown at the palatal corner, as seen at *b*. Connect the two by a fairly deep groove along the palatal border. A rose bur run around the rest of the cavity borders, making a general but not deep groove, gives us a strong cavity readily filled. To place the gold, begin in the palato-gingival extension, and having securely anchored the gold at that point, build along the palatal groove and also along the gingival border simultaneously, being careful not to advance either too rapidly, lest the excess of gold placed at one point make the other inaccessible. This is a very important factor in the successful filling of a bicuspid. It will be seen that by following this plan we finally come to a point where the labial corner at *c* must receive attention. Especially where the labial border of the cavity is at some distance from the labial surface proper, any undercutting at this part becomes quite difficult to fill, and the most unmanageable point of all would be at *c*, so that as we approach this place we must use greater caution. It must be filled before the gold has been brought so close that we have inadequate room to reach it ; and yet in packing gold into this corner, if we at once build it out to the edge of the cavity, we will find it difficult to fill the hollow which will have been left behind along the surface of the gold. More than likely when we come to polish the filling we will find an ugly pit, caused by an insufficiency of gold. The remedy is simple, but requires patience. Though for the bulk of the filling we may have been using fairly large pellets, as soon as we arrive at this corner we must choose smaller pieces of gold and build slowly. Strictly speaking, we should have been using heavy foil only, for some time previous to reaching this place. To fill the actual corner we should select small pellets, and as soon as these have brought the filling about half-way from the bottom of the cavity to the margin, we should return to heavy foil, which because of its form is peculiarly adapted to our needs here. With it, by proper manipulation, a filling should result which would be without a flaw.

Fig. 130.

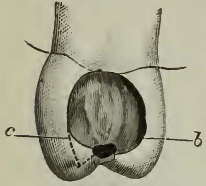
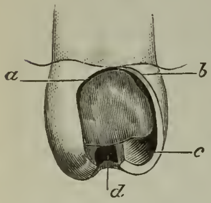


Fig. 130 shows a common form of cavity, such as is sometimes termed a compound cavity, because it occupies both crown and approximal surfaces. The arrangement for retention is precisely similar to the last, except that, as we now have an anchorage in the crown, we need not make the deep undercut at *b*. As before, *c* becomes a point of interest, greater here than in the last condition. If left as pictured, with a narrow passage connecting approximal and crown, the resulting sharp corner will give considerable trouble. The similar angle on the palatal side will not be as bad, though even there it may be trimmed down with advantage. At *c*, however, the labial angle should be removed as indicated by the dotted line, which, if studied, will be seen to follow the natural curve of the labial border line. When filling this cavity, as in the last case, this part will need extra care. Supposing that all has advanced as in the last, the best plan will be to give attention to the part of the cavity occupying the crown, and fill that thoroughly without special reference to the approximal portion. This done, we have reduced the case to exactly what we had in the last cavity when we came to fill *c*, and consequently can now proceed as then. Should we attempt to fill *c* before attending to the crown, we would find it very troublesome. In fact, it would be necessary to alternate between the approximal and the crown, causing much annoyance, especially as it often happens that the position of the patient must be altered so as better to see one or the other. To fill the crown first, simplifies the operation, and is therefore preferable. In these extensive approximal cavities, the gingival border is always a most trying obstacle to success. To obtain a perfect margin to these cases is as difficult as it is essential. I rarely make a deep groove or undercut here, but rather aim to leave the margin strong and very slightly beveled. More strictly speaking, instead of beveled —a word usually applied to the extreme edge of a cavity—I should say that I form it continuous with the floor of the cavity. This allows the placing of a fairly large pellet of gold, which, attached to that already secured in the palato-gingival extension, may be laid against and lapped over this gingival margin, and partly condensed by hand-pressure, using a foot-plugger. Next I cover this with a piece of No. 60 gold and mallet it down, again using the foot instrument. By this method the whole border is well and rapidly covered, the under pellet serving as a soft cushion which easily adapts itself to irregularities under the mallet-stroke, while the heavy foil is stiff enough to hold all in place as it is condensed.

As with incisors, the palato-approximal cavity is more difficult in a bicuspid than the labio-approximal. I may therefore better choose the latter for an illustration to show in what its management differs from that advocated in the incisor region. Fig. 131 shows a bicuspid having such a cavity. There might be circumstances under which I should use a screw here, but when we remember that this position is inaccessible, and that a screw renders any case more trying, it is plain that only extreme necessity would urge its adoption. The main reliance here will be to resort once more to labio- and palato-gingival extensions, as shown at *a* and *b*. I should not make much of a groove under the labial wall, but, passing from the palato-gingival extension, I should make a slight groove along the palatal border, deepening it as I approached the crown, till at *c* it became a distinct concavity. Whether caries has involved the crown or not, the sulcus must be cut out across to its opposite extremity, and at that point a deep retaining-pit should be made as advocated and illustrated by Fig. 28, shown also less distinctly in the present figure at *d*. In some instances, possibly because of extreme sensitiveness, or perhaps from the poor shape of the tooth, only very slight retentive shape may be attainable along the gingival part of the cavity. This would necessitate a proportionate deepening of the palatal groove and the formation of a more distinct one under the labial wall, care being taken not to so undermine it as to weaken it. I should call attention here to the fact that these directions exactly contradict those given for the same cavities in the incisors. There the groove, when made at all, was along the wall left standing, while in bicuspids I direct that it shall be made along that side where the greatest loss has occurred. The latter principle is the more correct, but it is inapplicable in the incisor, for there, there will not be found sufficient space in which to make a groove, which, if it escape the pulp, will not leave the enamel which it undermines so weak that it adds nothing to the strength of the cavity. In the bicuspid it is different. Even were the palatal part of the approximal surface removed till we reach a plane in line with the center of the pulp, owing to the width of the tooth we could still always cut a groove which would make a strong retaining formation, as seen in Fig. 131 at and between *b* and *c*. In filling these cavities the usual method as described in the previous cases would be followed, save that we should build against the labial wall before the palatal. But in the exceptional cases described, where we get but poor retentive shape along the approximal part of the cavity, we might find it better to begin in the retaining-pit in the crown and build over and into the approximal part, as has been alluded to in the description of the use of heavy foil.

Fig. 131.



In making contour fillings in bicuspids where the cavity is similar to that in a cuspid, shown in Fig. 126, no special change of plan is to be made, save that where there we had a single undercut in the end of the cusp at *e*, in a bicuspid we may have one in each cusp, and beside resort to the retaining-pit in the sulcus, as in the last figure.

I may now pass to molars, which, though in many respects similar to bicuspids, still present some points of difference. Usually there is so much tooth-substance in all directions that we may almost make the rule that in each given case we shall decide according to the conveniences, and possible dangers of exposing the pulp. In molars more than in any other teeth we should be always cognizant of the fact that *the younger the tooth the larger the pulp.* I remember that once in a first superior molar in the mouth of a miss of twelve, I found an exposure of the pulp in a cavity so shallow that without alteration it would not have retained a gutta-percha filling. *Per contra*, late in life we often see molars in which the most extensive undercutting may be attempted with little danger.

Fig. 132.

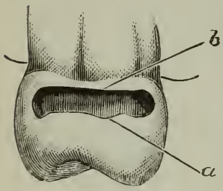


Fig. 133.

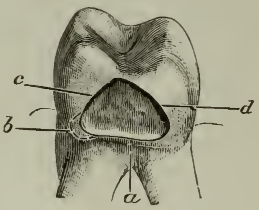
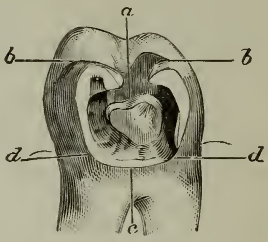


Fig. 134.



On general principles I may say that in approximal cavities in molars I depend chiefly upon two opposing grooves. I prefer that these should lie along the buccal and the palatal borders, but under some circumstances they would be situated otherwise. Such a condition is shown in Fig. 132, in which we observe a narrow cavity extending along the gum-line and partly around the buccal surface. Such cavities often result from the use of ill-fitting clasps, though they may occasionally occur where no clasps or bands have been used. Here we have a condition practically similar to one of the cavities in the bicuspid at Fig. 128. The filling may be retained by grooves along the borders at *a* and *b*, and the gold may be introduced readily with even a small space, being passed in at the buccal aspect. Where a similar cavity encroaches upon the palatal surface, it is much more difficult. If the tooth be on the left upper side of the jaw, I turn the patient's head so that, looking across the roof of the mouth, I may see into the cavity through its palatal extension, and I place the first pellet through this aperture, packing it into the extreme buccal end. From this I build toward and finish at the palatal part. On the right side I follow the same general rule, save that here one must resort more to the mouth-mirror. In the lower jaw all is different. To fill with gold with any hope of success, the widest possible separation is needed, and even then it will often be found difficult, if not impossible, to pack the gold properly should the tooth be long. If the cavity in addition should be on the distal surface, it will be trebly troublesome. Therefore, where I decide to use gold, I most often extend the cavity toward the crown, as shown in Fig. 133, in extreme cases even cutting through to the crown proper. Where such extension is decided upon I do not make much of a groove along the gingival border *a*, but I make a linguo-gingival extension at *b*, at which point I start the filling, and place grooves along the borders at *c* and *d*, of decreasing depth as they approach the crown.

FIG. 135.

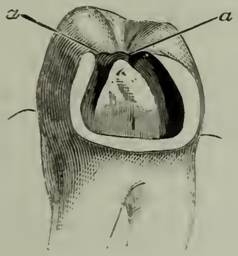


FIG. 136.

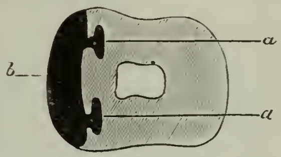


Fig. 134 shows a very unpleasant condition. It is what we term a saucer-shaped approximal cavity, in a molar. Where the dentine is very sensitive, we often find it almost impossible to obtain any anchorages along the gingival border, and, strictly speaking, it is not needed, for the filling can be perfectly retained without disturbing this part of the tooth other than to cleanse it of all decay. Once more I should depend upon lateral grooves along the buccal border, and the palatal, or lingual if it be the lower tooth. But these grooves would be the reverse of those in Fig. 133. There they were deepest nearer the gingival portion. Now I should begin by making an extension into the crown as shown at *a*, with lateral wings or dovetails indicated at *b*,*b*. From these dovetails I would carry my grooves deep into the tooth-substance, decreasing the depth until they emerged at *d*,*d*. Between these points *d*,*d* we have the gingival border *c*, which I have said may be the most sensitive part of the dentine, and we need no undercutting. But where the dovetailing into the crown would leave the lateral walls weak, then we will simply be forced to abandon that plan, making the lateral grooves as deep as consistent with strength, and forming a gingival groove as far as we are enabled.

Fig. 135 shows the loss of the buccal corner as well as the palatal, so that a full contour is required. Where only one corner is absent, the filling may be anchored chiefly into a deep undercut into that which remains standing; but where both are absent, as in the figure, the retaining arrangement is sufficiently unique to excuse a special description. I should make a gingival groove ending in deep dips at each end, similar to the palato- and labio-gingival extensions alluded to in other cases. From these I should extend grooves toward the crown, as shown at *a*,*a*. It is the formation of these which is unique. I take a rose bur first, and make the groove as deep as determined; then I follow with a wheel bur larger than the diameter of the rose bur. This wheel, passing from end to end of each groove, forms a lateral undercut in each, which must be made deepest toward the pulp. To better illustrate the idea I introduce Fig. 136, which is a section through the center of a filling placed in such a cavity. The approximal surface is shown at *b*, whilst *a*,*a* indicates that part of the filling which occupied the grooves. In addition to these retainers, if considered necessary, an extension may be made across the crown and into the opposite sulcus, as already described in discussing bicuspids.

(To be continued.)

CORRESPONDENCE.

THE AUTOMATIC MALLET.

To the Editor of the Dental Cosmos:

Sir,—In reading Dr. Ottolengui's article on "Methods of Filling Teeth" in the March number of the Dental Cosmos, I was somewhat surprised at his reason for objecting to the use of the automatic mallet. All sorts of objections have been taken to this instrument, and various reasons put forward why it should never be used as a condenser of gold, but I do not remember anyone raising such an objection as the above writer advances. As the doctor admits candidly that just as good work can be done with the automatic mallet as with any other, I will not say anything on that point, though the many reasons given by various practitioners against its use, such as its giving an unnatural blow, etc., often make me feel like taking up the cudgels in defense of one of the most useful instruments in the hands of the profession. Dr. Ottolengui says, "With all other instruments than the hand-mallet, the patient is practically connected with the instrument all the time; this is especially true with the automatic." He then asks if, when the point is allowed to rest against the filling and pressure being exerted till a released spring causes a blow to be struck, "Is it not evident that the whole blow is anticipated by the patient every time?" "Is it not plain that to a nervous person this expectation of the coming stroke must be maddening?"

These two questions may appear perfectly logical, but my several years' experience with the automatic mallet prove to me that the coming stroke or blow is not perfectly maddening to any patients I have had under my care. On the contrary, after the first few blows, the patient does not mind it nearly so much as the sudden blow from the hand-mallet, the harsh, metallic blow from the engine-mallet, or the noisy one of the electric.

If the being connected with the instrument all the time has any effect, it seems to me that it is far from an evil one, at any rate in the use of the automatic ; for the patient, feeling the point of the plugger pressed against the filling, knows just what to expect, and is not nearly so much shocked when the blow does come as by the sudden thud from the hand-mallet. With a smooth-working, nicely-oiled automatic mallet the blow can be given so nearly simultaneously at the time of contact that the pressure period is hardly noticeable ; especially is this so when working on large fillings. It is not my purpose, however, to try and explain why the automatic mallet is much the most humane instrument with which to condense gold fillings, but merely to state that such has been my experience, as it has also been of all my dental friends who are using it. By far the greatest number of my patients give it a decided preference ; there are very few who are neutral, and I don't remember *one* patient preferring any of the other mallets, but many are the profuse thanks and expressions of gratitude I have heard from my patients for not pounding them with the hand-mallet. Like Dr. Ottolengui, I have had it used on my own teeth, and certainly prefer it to any other, nearly all of which I have tried. I notice that the doctor does not state that his experience with the use of the automatic in his practice caused him to abandon its use, but from having it used on his own teeth. May not his repugnance to it be one of those exceptions which go to prove the rule? I am inclined to think so. H. C. Raymond, D.D.S.

Detroit, April 18, 1892.

TRANSLATION.

PENTAL.

BY DR. A. HÄGLER, ASSISTANT GENERAL POLYCLINIC, BASEL.

(Translated from *Schweizerische Vierteljahrsschrift für Zahnheilkunde*, vol. ii, No. 1, 1892.)

Trimethyl-ethylene, obtained from amylenhydrate heated with acids, and called pental by Professor v. Mering, we have tested in about forty cases, on the recommendation of Professor Hollaender in *Therapeutischen Monatsheften*. Our supply came from the laboratory of C. A. Kahlbaum, Berlin.

The anesthetic was, like bromide of ethyl, employed only for short operations, such as extraction of teeth, etc. The inhaler we employed consisted of a double mask covered with "imperméable," and supplied with an additional layer of cotton. An opening on the top of the inhaler, which may be closed at will, permits any desired prolongation of the narcotic state without removing the mask.

Narcosis was induced in a sitting as well as in a horizontal position, after all tight clothing had been loosened. In cases of children, five cubic centimeters and in those of adults ten cubic centimeters of pental was poured on the mask, which was then firmly held to the patient's face, leaving the eyes unobstructed. My observations concerning narcosis by means of pental, which, I am sorry to say, do not always agree with those of Dr. Hollaender, are as follows :

Narcosis makes its appearance slowly, and usually quietly. The eyes, closed at first, open, the pupils dilate, and the eyes assume a staring expression.

I have often been able to observe a state of excitation in the beginning of the narcosis, which Dr. Hollaender mentions only in the rarest cases, and then in a weak form. In one case, that of a very excitable, anemic girl (removal of a tubercular metacarpal bone), the excitation lasted during the whole narcotic period, the patient of course being in entire ignorance of the fact. In nearly all cases a slight hyperemia of the facial skin could be observed, which began with gradual heating of forehead and cheeks.

The time required for the production of a complete state of narcosis varies much, one-half to two minutes being required.

A fair representation of the condition of a patient fully under the influence of pental is the following :

The arms hang down in a lethargic state ; the eyes are wide open and staring, the pupils are dilated, and in most cases the corneal reflexes are still active. The sensorium, also, does not seem to quite disappear, as many patients revive upon energetic commands from the operator.

I have never noticed salivation in cases of pental narcosis, which has often been observed when bromide of ethyl is used, and which is very undesirable, especially in extractions. The duration of the narcotic state fluctuated, with our method of application, between three and seven minutes. I have no experience concerning longer periods.

The revival from the effects of this anesthetic is quite rapid. The patient is almost invariably in the best of humor, and I remember but one case where a woman awoke, laboring for quite a while under physical depression, caused, she averred, by unpleasant dreams.

Unpleasant after-effects, such as headache, sick stomach, etc., have so far not been noted, and have not been observed by us. Complete ignorance of the operation and its details reigns after a thorough application.

I am sorry that I cannot agree with Dr. Hollaender as to the entire safety of pental, as I was compelled to witness a very unpleasant incident. To demonstrate pental narcosis to some colleagues, I selected a healthy student as the subject. I applied the narcotic to the amount of ten cubic centimeters in a sitting posture, having first opened the shirt and loosened the waistband of the patient. After some deprecatory motions with the arms, cyanosis ensued slightly. In about ninety seconds the arms hung down listlessly, the eyes were staring wide open, the pupils dilated, the corneal reflexes still observable, and the pulse regular and strong. The narcosis was then discontinued. At this moment a constantly-increasing dyspnœa set in, with intense cyanosis, which grew stronger despite the fact that the tongue was pulled fully out. The patient was laid on the floor, his appearance being cyanotic, and his face turgid ; the pulse was not perceptible. Artificial respiration was at once resorted to, inducing natural respiration in about two minutes, and in one or two minutes afterward the patient was able to rise from the floor without much assistance. The experiment had no detrimental after-effects, and the patient could resume his duties as assistant of the chirurgical polyclinic a few minutes later.

PROCEEDINGS OF DENTAL SOCIETIES.

ILLINOIS STATE DENTAL SOCIETY.

The twenty-eighth annual meeting of the Illinois State Dental Society was held at Springfield. Ill., May 10 to 13, 1892.

The following officers were elected for the ensuing year: E. K. Blair, president; C. N. Johnson, vice-president; Louis Ottofy, secretary; W. A. Stevens, treasurer, and F. H. McIntosh, librarian.

The next meeting will be held at Rock Island, commencing on the second Tuesday in May, 1893.

Louis Ottofy, *Secretary*,
Masonic Temple, Chicago, Ill.

DENTAL SOCIETY OF THE STATE OF NEW YORK.

At the twenty-fourth annual meeting of the Dental Society of the State of New York, held at Albany, May 11 and 12, 1892, the following officers were elected for the ensuing year: W. W. Walker, New York, president; F. T. Van Woert, Brooklyn, vice-president; C. S. Butler, Buffalo, secretary; H. G. Mirick, Brooklyn, treasurer; R. Ottolengui, New York, correspondent.

Chas. S. Butler, *Secretary*.

FIRST DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

At the annual meeting of the First District Dental Society of the State of New York, held April 12, 1892, the officers elected for the ensuing year were as follows: William Carr, president; John I. Hart, vice-president; Benj. C. Nash, secretary; Kasson C. Gibson, treasurer; J. Bond Littig, librarian. Delegates to the Dental Society of the State of New York, for four years, J. W. Taylor and William C. Deane; for one year, Henry J. Hull. Standing committees, appointed by the president: Executive Committee, A. L. Northrop, Delos Palmer, and William Wallace Walker, chairman; Clinic Committee, John H. Meyer, Henry J. Hull, and C. F. W. Bödecker, chairman.

B. C. Nash, *Secretary*.

ST. JOSEPH DENTAL SOCIETY.

The dentists of St. Joseph, Mo., having taken preliminary steps for the formation of a local society for the advancement of their profession in that vicinity, held their first meeting on Tuesday, May 10, 1892, and effected a permanent organization by the election of the following officers: C. H. Darby, president; J. J. Newell, vice-president; H. D. Atkinson, secretary, and C. J. Kessler, treasurer.

Howard Atkinson, *Secretary*.

DENTAL COLLEGE COMMENCEMENTS.

UNIVERSITY OF PENNSYLVANIA—DEPARTMENT OF DENTISTRY.

THE thirteenth annual commencement of the Department of Dentistry of the University of Pennsylvania was held, in connection with that of the Medical Department, at the American Academy of Music, Philadelphia, Pa., on Friday, May 6, 1892, at 12 o'clock M.

The valedictory address was delivered by John Guiteras, M.D., Professor of General Pathology and Morbid Anatomy.

The number of dental matriculates for the session was one hundred and sixty-nine.

The degree of D.D.S. was conferred on the following graduates by William Pepper, M.D., LL.D., provost of the university:

NAME.	STATE OR COUNTRY.
Carlos A. de Armada	Brazil.
Josiah Ayres	P. Edw. Island.
Harry K. Baer	Pennsylvania.
Walter G. Beitzel	Kansas.
Jos. L. Benninghoff	Pennsylvania.
Johannes Berger	Germany.
Fred M. Bodine	Pennsylvania.
Francis H. Bond	Pennsylvania.
Edward W. Bonwill	Pennsylvania.
John J. Bowen	Rhode Island.
Andrew Law Brown	Connecticut.
W. E. Christensen	Denmark.
Frank T. Clark	Pennsylvania.
Edward B. Coen	Illinois.
Frederick L. Condict	New Jersey.
Frank P. Cook	Pennsylvania.
William M. Cooper	Pennsylvania.
Chas. W. Crankshaw	Pennsylvania.
Joseph T. Danforth	Pennsylvania.
V. H. Diefenderfer	Pennsylvania.
Jeremiah H. Dreher	North Carolina.
J. S. Eldredge	New Jersey.
John B. Ernsmere	New York.
Richard J. Flexer	Pennsylvania.
J. Beaver Gearhart	Pennsylvania.
Lewis H. Gilbert	New York.
Henry E. Goddard	England.
A. Herbert Grubb	Pennsylvania.
William Gunn	New Zealand.
Harry B. Hamilton	New York.
Arch Coombs Hart	California.
Edward B. Hause	Pennsylvania.
Melvin G. Haynes	New York.
Robert H. Hine	Connecticut.
Walter T. Holmes	Connecticut.
Paul Hotz	Switzerland.
A. Scott Ives	Canada.
Edward B. Joachim	Pennsylvania.
Geo. H. Johnson, Jr	Bahamas.
Oakley Johnson	Washington.
H. Frank Johnston	Canada.
James H. Kittams	New York.
Johannes Kniewel	Germany.
B. Landsberg	Germany.
Elbert W. Lapp	Pennsylvania.
Burtis E. Lawton	Nebraska
W. J. ter K. Lemker	Holland.
Chas. J. Leonhardi	California.
William J. Le Suer	New York.
Louis G. Ligondé	Hayti.
José Lúcio López	Central America.
Clarence D. Lukens	Iowa.
Patrick F. Lynch	Pennsylvania.
Edouard Matthey	Switzerland.
W. Clay Middaugh	Pennsylvania.
Vethake E. Mitchell	Ohio.
Frank D. Murto	Pennsylvania.
George H. Nellis	New York.
Charles Newgarden	Pennsylvania.
Edward E. Parshall	Pennsylvania.
Harry D. Phipps	Texas.
Albert B. Protsman	Indiana.
John W. Richards	Pennsylvania.
Shessie W. Ridgway	Pennsylvania.
Alfred T. Ross	Pennsylvania.
James F. Rymer	England.
T. Darwin Saunders	New York.
P. Frank Schoff	Pennsylvania.
J. Clark Segar	Connecticut.
Robt. J. Seymour	Canada.
E. Harvey Skillman	New York.
A. Fowler Smith	New York.
W. Harry Sowash	Pennsylvania.
James R. Stathers	West Virginia.
Charles A. Stewart	Pennsylvania.
Harry R. Swing	Pennsylvania.
Frank C. Wardell	Pennsylvania.
Edward P. Whitlock	Pennsylvania.
S. Edwin Whitmer	Pennsylvania.
Albert L. Willis	Washington.
George J. Wimmer	Pennsylvania.
P. Windmüller	Germany.
Carl Witthaus	Germany.
E. C. Wuensche	Germany.

JUNE 11, 1891.

NAME.	STATE OR COUNTRY.	NAME.	STATE OR COUNTRY.
Philip W. Adams	Massachusetts.	Thos. A. McCarthy	New Hampshire.
A. Lee Foster	Pennsylvania.	Robert Macdonald	Australia.
William B. Horter	Pennsylvania.	John M. O'Bourke	Cuba.
George A. Lawton	Connecticut.	George R. Ulrich.	Pennsylvania.

DENTAL SOCIETY ANNOUNCEMENTS.

SOUTHERN DENTAL ASSOCIATION.

THE next annual meeting of the Southern Dental Association will be held at Lookout Mountain, Chattanooga, Tenn., commencing July 26, 1892.

The hotel accommodations are ample, and reasonable in price. The historic associations and scenic surroundings make Lookout Mountain the most attractive place that could be selected. The arrangements for the comfort of dentists visiting the meeting have been looked after by the local committee.

Every arrangement for transportation will be made. Do not neglect to get your certificate from the local agent when you purchase your ticket.

Look for later announcement.

H. C. HERRING, *Secretary*, Concord, N. C.
S. G. HOLLAND, *Chm'n. Exec. Com.*, Atlanta, Ga.

NATIONAL ASSOCIATION OF DENTAL FACULTIES.

THE ninth annual meeting of the National Association of Dental Faculties will be held at Niagara Falls, on Monday, August 1, 1892, at 10 o'clock A.M.

Applications for membership must be in the hands of Dr. J. Taft, chairman of executive committee, sixty days prior to the meeting.

J. D. PATTERSON, *Secretary*, Kansas City, Mo.

NATIONAL ASSOCIATION OF DENTAL EXAMINERS.

THE annual meeting of the National Association of Dental Examiners will be held at Niagara Falls, on Monday, August 1, 1892, at 10 o'clock A.M. All State Boards are invited.

FRED. A. LEVY, *Secretary*, Orange, N. J.

JOINT UNION MEETING OF PENNSYLVANIA AND NEW JERSEY STATE DENTAL SOCIETIES.

THE attention of the profession is called to the formation for this meeting, to be held at Cresson Springs, Pa., July 19, 20, and 21, 1892, of a clinical conference, composed of well-known practitioners, to be divided in three sections, for the presentation by dentists in actual practice for advice in Section 1, Oral Surgery, viz, Treatment of Pyorrhea Alveolaris, Congenital Deformities, Oral Irregularities, etc.; Section 2, Mechanical Dentistry, Crown- and Bridge-Work, Gold and Porcelain Crowns, Metal and Plastic Bases, etc.; Section 3, Operative Dentistry, all cases in general practice.

Dentists are requested to communicate at an early date with the undersigned chairmen of the state committees.

DR. W. E. MAGILL, Erie, Pa.
DR. H. A. HULL, New Brunswick, N. J.

MASSACHUSETTS DENTAL SOCIETY.

THE twenty-seventh annual meeting of the Massachusetts Dental Society will be held in Boston, July 7 and 8, 1892. It is intended to make this meeting of unusual interest. The annual address is to be delivered by Dr. L. D. Shepard, of Boston, and other prominent men are expected to participate in the meeting. All members of the profession are invited to attend.

EDGAR O. KINSMAN, *Secretary*, Cambridge, Mass.

AMERICAN DENTAL SOCIETY OF EUROPE.

THE American Dental Society of Europe will hold its eighteenth meeting at Basle, Switzerland, August 1, 2, and 3, 1892. Members of the profession are cordially invited to attend. Clinics will be a special feature of this meeting. The university will place desirable rooms at the disposal of the society, and an ingenious ampitheater, for accommodating in the immediate vicinity of the patient a larger number of spectators than are able to witness operations under the ordinary circumstances, will be loaned by the Swiss Dental Association. Programs can be had on application to the president, Dr. Bryan, of Basle, or to CHAS. W. JENKINS, *Secretary*, Zürich.

MISSOURI STATE DENTAL ASSOCIATION.

THE twenty-eighth annual meeting of this association will be held at Clinton, Mo., commencing Tuesday, July 5, and continuing four days. Members of the profession are cordially invited to be present.

WILLIAM CONRAD, *Cor. Sec'y*, St. Louis, Mo.

INDIANA STATE DENTAL ASSOCIATION.

THE thirty-fourth annual meeting of the Indiana State Dental Association will occur June 28, 29, 30, 1892, at Lake Maxinkukee, Ind. The State Board of Dental Examiners will meet at the same place and time. All dentists and physicians are cordially invited to attend.

G. E. HUNT, *Secretary*, Indianapolis, Ind.

KENTUCKY STATE DENTAL ASSOCIATION.

THE twenty-second annual meeting of the Kentucky State Dental Association will be held at the Louisville College of Dentistry, Louisville, Ky., commencing on Tuesday, June 21, 1892, the sessions to continue for three days.

Members of the dental profession at large are cordially invited to attend and participate in the proceedings.

J. H. BALDWIN, *Secretary*,
609 West Chestnut street, Louisville, Ky.

MINNESOTA STATE DENTAL ASSOCIATION.

THE annual meeting of the Minnesota State Dental Association will be held at Minneapolis, Minn., commencing July 13, 1892; the sessions to continue for three days.

L. D. LEONARD, *Secretary*,
251 Nicollet avenue, Minneapolis.

PENNSYLVANIA STATE DENTAL EXAMINING BOARD.

The Pennsylvania State Dental Examining Board will hold its next meeting during the session of the State Dental Society, at Cresson, Pa., commencing Wednesday, July 20, 1892.

Persons who intend to come before the board for examination are requested to notify either the president or secretary, and to show specimens of their work.

W. E. Magill, *President*, Erie, Pa.
J. C. Green, *Secretary*, West Chester, Pa.

EDITORIAL.

THE DENTAL ASPECT OF IT.

Between medicine and dentistry there has always existed a certain territory, so to speak, which has been regarded by both as common ground; and each has claimed it as a legitimate field of practice and research. The two departments naturally meet and merge at certain points; each views the field from the standpoint of a special culture, which in any given case is brought to bear upon it with the object of securing successful results in practice.

This difference in mental attitude of the physician and dentist toward problems which they meet in common, and which cannot be wholly relegated to the sphere of either, is important when regarded from the standpoint of its results,—so important in fact that it is a factor in one of the vital problems of dental education: viz, of so broadening the dental curriculum with regard to this common ground between dentistry and medicine that it shall in due course become unrestrictedly and beyond question the legitimate field of the dental practitioner. This expectation becomes reasonable in view of the steady progress of dentistry in this direction, the effect of which has been by careful, scientific labor and research to continuously broaden its limits, until many points of contact have developed between dentistry and medicine which bring into strong contrast at times the standpoints from which a problem common to both is viewed by practitioners of each, and not unfrequently demonstrates the superior value of the special dental training in its solution.

A recent publication * by a writer of acknowledged authority, whose book has received favorable notice by the medical journals, condemns the operation of gum-lancing as a therapeutic measure for the relief of certain pathological conditions incident to the first dentition, on the following grounds :

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* The Diseases of the Mouth in Children (Non-Surgical). By F. Forchheimer, M.D., Professor of Physiology and Clinical Diseases of Children, Medical College of Ohio; Member of Association of American Physicians and American Pediatric Society, etc. Philadelphia, J. B. Lippincott Company, 1892.

"I. It is useless : *a*, as far as giving relief to symptoms ; *b*, as far as facilitating or hastening teething.

"II. It is useful only as blood-letting, and ought not to be used as such.

"III. It is harmful : *a*, in producing local trouble ; *b*, in producing general disturbances, on account of hemorrhage ; *c*, in having established a method which is too general to do specific good and too specific for universal use.

"IV. It is to be used only as a surgical procedure to give relief to surgical accidents."

A critical examination of the grounds upon which he bases these remarkable conclusions reveals a deplorable ignorance on the part of the author of the anatomical relations of the tissues involved in the teething process, as well as of their physiology. He is equally in the dark as to the causes of pathological disturbances arising from abnormalities in the process of dentition. While he recognizes fully the coincidence of certain grave systemic and nervous disorders with the process of dentition, he regards them only as coincidences. He "does not admit that on theoretical ground convulsions are caused by teething," but deems that "such a connection may be possible." He says, "as a matter of fact, gum-lancing neither prevents nor cures convulsions due to teething in all instances," and that "convulsions that can be cured by gum-lancing can be cured by the most simple means,—lukewarm bath, a mild laxative, a full dose of bromide of potassium ; they will get well of themselves if the physician will be wise enough to remove the cause, which must be looked for everywhere else than in the teeth." His understanding of the rationale of gum-lancing is embraced in the following quotation : "Locally the scarification does nothing except let blood ; the idea that tension within the sac is relieved is a purely imaginative one. There is no tension within the sac, and, as has been shown, there is more than enough room for the tooth, so that under normal circumstances pressure within the sac or upon its bony surroundings in all directions becomes an anatomical impossibility. Under abnormal conditions lancing of the gums has no effect upon the condition within the tooth-sac." Throughout the treatment of this phase of his subject he uses the terms scarification and lancing synonymously, a confusion of terms naturally to be expected in the mind of one who has lost sight of the principal, if not only, reason for the operation of gum-lancing ; namely, for the relief of irritation not of the overlying gum-tissue, but of the formative pulp of the erupting and developing tooth, caused by backward pressure upon it by the margins of the incompletelyformed root, due to the unyielding resistance afforded by the gum to the normal eruption of the tooth. Perhaps the most lucid explanation of his whole attitude of antagonism to the operation in question is to be found in the following quotation: "In my whole experience I have lanced the gums once; then at the earnest solicitation of a consultant; the result was *nil.*"

The publication and dissemination of such views by a practitioner of standing cannot fail to be productive of incalculable harm, whether regarded from the standpoint of truth or with respect to their effect upon practice in this field. We are not prepared to express any opinion as to the extent to which similar views are held by medical practitioners, but from the fact that in the present instance they have received commendation by the medical journals, it seems to us a duty, in the light of what has been developed on the dental side of this issue, and is now accessible to all and should be the common property of all practitioners in anyway related to the treatment of disorders of the first dentition, to call attention to and record a protest against the fallacies here promulgated, in the hope of preventing the serious consequences which must necessarily follow such antiquated teachings, an adherence to which is largely responsible for the present high rate of infant mortality. With regard to the relation between infantile convulsions and pathological dentition, there can be no doubt. That these are relieved by proper gum-lancing is unquestionable. This is simply a question of fact, regardless of any theories involved, which is fully admitted and attested by those practitioners both of medicine and dentistry who know how to properly perform the operation of gum-lancing. The possibility that a peripheral dental irritation may produce sufficient cerebral disturbance to cause convulsions is a rational one, and as readily understandable as that peripheral irritation of any other sort may produce convulsions; more probable, even, when the anatomical relations of the parts are considered. Upon this point we quote from Dr. J. W. White, in the "American System of Dentistry," volume iii, page 326: "It must be remembered that at the period of eruption the roots of the teeth are yet incomplete. Instead of the conical termination and minute foramen which characterize a perfected tooth, the aperture is nearly as large as the root itself, and thus when the sensitive pulp, made up of connective tissue, blood-vessels, and nerves, is in a condition of irritation because of the morbid activity of the process of dentition,—augmented vascular and nervous action,—there may be produced a hyperæmia sufficient, possibly, to cause the protrusion of a part of the mass from the incomplete aperture of the root, giving abundant cause for extreme constitutional disturbance. If in the adult the irritation of a dental nerve may give rise to otalgia, otorrhœa, deafness, amaurosis, hemicrania, neuralgia, hysteria, chorea, epilepsy, tetanus, etc., it is surely not only possible, but highly probable, that a like irritation may be the occasion of grave and even fatal disorders in the infant."

It is for the relief of this pressure upon the dental pulp, and not upon the overlying gum-tissue, for which the operation of gum-lancing is advocated, and it is under these circumstances that the best results are obtained. No one who has witnessed the instantaneous relief from distressing symptoms in such cases can doubt the relation of cause and effect between the abnormal eruption and the therapeutic measure of gum-lancing intelligently performed.

Dr. Forchheimer admits the coincidence, but does not admit the causal relationship. His lack of knowledge of the dental aspect is perhaps a sufficient reason for this ; but why, in the light of all that has been written on the subject from a dental standpoint, should he be ignorant? It is this feature that we criticise and condemn, and it is the importance of this dental end of the matter that we urge not only upon him as a medical teacher but upon every medical practitioner. Gum-lancing does not mean gum-scarification, and so long as the latter is practiced for the relief of conditions only amenable to the former operation, just so long will the results accord with those of the single case which represents the sum total of the lifetime experience of this authority on pathological dentition. Gum-lancing, properly and intelligently done with a view to freeing the entire tooth-crown and so relieving the pulp-irritation caused by the backward pressure of the developing root, is a therapeutic measure of unquestionable value ; and when the undisputed relationship which the diseases incident to the first dentition bear to the high rate of infant mortality is considered, ignorance regarding the scientific use of the lancet and the reasons and indications therefor becomes as culpable in a practitioner as ignorance concerning any other well understood therapeutic measure.

CHLORIDE OF ETHYL AND PENTAL.

THESE two substances recently introduced to the notice of the dental profession, the former as a refrigerant local anesthetic and the latter for the production of general anesthesia, have heretofore been studied only from the clinical standpoint. The extreme importance of the subject of anesthesia in its vital relations, and the grave dangers attending the use of anesthetic agents used empirically and without full knowledge of their physiological action, have led us to institute a careful and thorough scientific investigation of the properties of these two new substances. The research has been carried out by Drs. Horatio C. Wood and David Cerna, in the physiological laboratories of the University of Pennsylvania, and some of the results of their investigation will appear in the July issue of the DENTAL COSMOS in a preliminary paper on the subject "Chloride of Ethyl and Pental," the perusal of which we commend to all who are interested in the subject of anesthetics.

COLLEGE ANNOUNCEMENTS.

THE executive officers of the various dental colleges will confer a favor on us, and occasionally, at least, do themselves a service by seeing to it that we get a copy of their annual announcements. Questions are frequently asked us by intending students, concerning particular colleges, answers to which would be greatly facilitated,—often to the advantage of the college concerned,—by a complete file of announcements.

OBITUARY.

DR. L. W. SIBLEY.

DIED, at Berwick, Maine, May 6, 1892, by drowning, LYMAN W. SIBLEY, D.D.S., in the thirty-ninth year of his age.

Dr. Sibley's death resulted from drowning in a trout brook while on a fishing excursion with a friend near Berwick, Me. The companions were separated from view at different points of the stream, and Dr. Sibley fell in an apoplectic fit, and was drowned in water only a foot and a half in depth.

Dr. Sibley was born in Petersham, Mass., February 12, 1854; attended New Salem Academy, and began the study of dentistry in 1876 with Drs. Tolman and Coxeter, at Athol, Mass. After remaining there one year he entered the Philadelphia Dental College, and graduated from that institution in the class of 1879. The same year he commenced practice in Rochester, N. H., where he lived up to the time of his decease. He was a man of exemplary life, and was much respected. He was married in 1881 to Miss Ellen F. Bradley, of Rochester, and leaves surviving him his wife and three children.

DR. THOMAS HALEY.

DIED, at Biddeford, Maine, May 10, 1892, of the grippe accompanied with brain fever, THOMAS HALEY, D.M.D., in the sixty-third year of his age.

Dr. Haley was born at Saco, Maine, November 14, 1829. He graduated at Kimball Union Academy at Meriden, N. H., in 1854. In 1855 he began the study of dentistry with Dr. Wm. H. Haskell, of Biddeford, and after completing his studies succeeded that gentleman in practice until 1862. He then enlisted in the Twenty-seventh Maine regiment, and served about a year in the war of the Rebellion, resuming his dental practice in 1863. He was a graduate of the Harvard Dental School, class of 1869. He was one of the charter members of the Maine Dental Society, and its president for one year; was also a member of the Merrimac Valley Dental Association, of which he was vice-president.

Dr. Haley was a member of the orders of Masons and Odd Fellows, and of several social organizations. He was also a leading member of the Second Congregational Church, and served it faithfully in many official positions. He was a successful practitioner, and much honored among his fellows. He married Isabella West, of Biddeford, and she and three sons survive him.

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

The abbreviations of titles used are those common to bibliographical work, and will, it is presumed, be readily comprehended by any one familiar with dental or scientific publications. Any explanation will be gladly furnished by the compiler. A star (*) indicates a Thesis.

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LIST OF UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING APRIL, 1892.

April 5.—No. 472,344, to George Evans. Metal tooth crown.
" " No. 20,929, Trade-Mark, to Girard & Letord. Aluminum solder.
April 12.—No. 472,683, to J. T. Pedersen. Hand-piece coupling.
" " No. 472,686, to W. E. Wells. Dental mallet.
" " No. 472,776, to W. W. Williamson. Dental engine.
April 19.—No. 473,040, to D. B. Wilder. Teeth regulator.
" " No. 473,397, to A. Kern. Chair.
" " No. 20,999, Trade-Mark, to A. Lilly. Dentifrice.

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ORIGINAL COMMUNICATIONS.

CHLORIDE OF ETHYL AND PENTAL.

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THE editor of the DENTAL COSMOS has submitted to us the two agents whose names head this article, with the request that we should investigate their physiological properties sufficiently to determine the question whether they can be of service as practical anesthetics. The present paper, therefore, is not an exhaustive scientific study of the physiological action of these two drugs. Chemists are so multiplying compounds, that if each compound is to be thoroughly studied by the physiologist the result would hardly be contained in the world's literature, and it is only worth while in the first place to carry these investigations far enough to determine the practical importance of new agents. This much of excuse for, what may seem to the pure physiologist, the lack of completeness of the present study.

In such an investigation as the present, the first point to be determined is whether the substance has anesthetic properties; the second question is whether the anesthesia produced is fugacious or permanent; the third question is whether such anesthesia is accompanied by danger to life.

CHLORIDE OF ETHYL.

Chloride of ethyl is at present largely used as a local anesthetic agent, which acts not by virtue of any inherent anesthetic properties but on account of the intense cold produced by its extraordinarily rapid volatilization. The extreme volatility of the chloride almost proves, *a priori*, that any effect which it may have upon the human system will be of correspondingly brief duration, since very volatile substances are thrown off from the lungs with rapidity. This *a priori* reasoning is entirely confirmed by our direct experiments.

We have found it difficult, without the construction of special inhalers for the use of large quantities of chloride, to produce anesthesia in the dog by the ordinary method of administration. The chloride disappears from an inhaler which allows free access of air, almost as fast as it can be poured on. We have used it in two ways. In the one way we connected a large rubber tube with a canula, placed in the trachea of the dog, and then squirted the anesthetic into the tube in such a way that it would diffuse itself over the walls of the tube for a considerable distance. The administration in this way of ten grammes of the chloride of ethyl failed to produce distinct anesthesia in the dog, although the respiration was affected and some fall of the arterial pressure occurred. We append details of two experiments.

Experiment I.—Dog weighed twelve kilos. Given ten grammes by inhalation, thrown into the tracheal tube in about three minutes. During this time the circulation varied at different periods considerably. No anesthesia was produced. The arterial pressure was at first reduced.

Experiment II.—Dog. Normal pressure 190 mm.; pulse-rate 120. Ten grammes chloride of ethyl introduced into tracheal tube as rapidly as possible. After an inhalation of twenty seconds, pressure 185, pulse-rate 144. Seventeen seconds later the pulse began to grow slow and the pressure to fall. Eleven seconds later mean pressure 155, pulse-rate 72; the individual waves varying from one to two cm. in height. This condition with gradual rise of pressure continued for a minute, when the pressure rose to 190 and the pulse-rate to 140. No anesthesia was produced.

Besides employing the ethyl chloride in the way just described, we have made one experiment in which a cone, almost impervious to the air and so flexible that it could be tightened around the dog's nose, had placed in it ten grammes of the liquid and then tightly applied. The results of this experiment are given in the table below.

Experiment III.—Dog, Weight 16 Kilos.

TIME. MIN. SEC.	PRESSURE. MM.	PULSE PER MIN.	RESPIRATION PER MIN.	REMARKS.
0.	168	150	66	
0.20	168	150	60	*Inhalation* of contents of one tube (10 grammes of drug) put in a very close receptacle, and this placed over the nose.
0.50	150	81	18	
1.20	120	105	60	Anesthesia.
3.20	160	168	90	Reflexes return.
6.20	160	144	150	Inhalation of contents of second tube.
7.20	150	150	33	No anesthesia.
8.10	160	150	51	Inhalation of contents of third tube.
8.40	150	144	24	Reflexes lost.
9.10	90	105	36	Animal eventually killed.

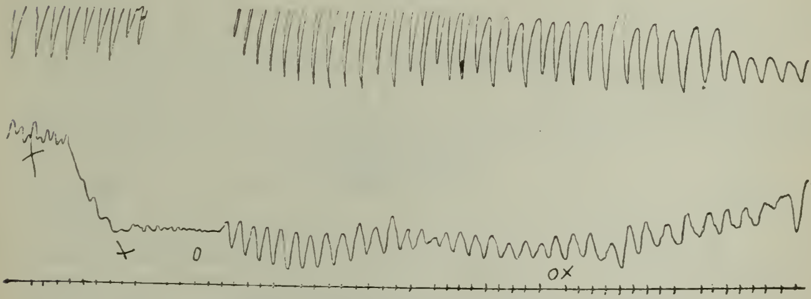
This experiment shows that the chloride of ethyl is capable of acting as an anesthetic, provided that its vapor be given in concentrated form. Why anesthesia was not produced by the second inhalation of ten grammes is not clear, but we believe that it was because air was taken in more freely, owing to the cone not having been placed tightly over the nose of the animal. The results of this experiment indicate, first, that the effect of the drug is exceedingly fugacious, since ten grammes failed to produce a complete anesthesia of more than two minutes' duration, this further in spite of the fact that air was not furnished with sufficient freedom to yield the full supply of oxygen to the blood ; second, that the anesthesia is accompanied with a marked fall in the rate of the pulse and the force of the arterial pressure ; the pressure having fallen forty-eight millimeters and the pulse 45 per minute at the coming on of the first anesthesia, whilst in the third inhalation shortly after the loss of the reflexes the pressure stood at 90 instead of the norm, 160.

Owing to the comparatively small amount of the chloride of ethyl put at our disposal, in the further study of the chloride of ethyl we confined ourselves to administering the drug by injecting it into the jugular vein. This method of experimentation has the advantage of greater exactness in dosage, and the results are entirely parallel with those which follow the administration of the remedy through the lungs.

It is plain that whether a drug be injected directly into the jugular vein, or whether it enter the system by absorption into the pulmonic capillaries, it must first reach the heart before being diffused throughout the general circulation. In the one case the drug passes first into the right side of the heart, whilst in the other case it goes into the left side of the heart. The anesthesia which follows the injection of the chloride of ethyl into the jugular vein is very fugacious, as is shown in the following tracing, which demonstrates the effects of the injection of two-tenths of a gramme into the jugular vein. The liquid was injected between the two crosses ; the anesthesia, as demonstrated by the loss of the cornea reflexes, appeared at the first "o" and disappeared at "ox," having therefore lasted less than half a minute. It will be seen that the amount of the anesthetic was sufficient to reduce the circulation to a very dangerous degree.

Experiment IV.

FIG. 1.



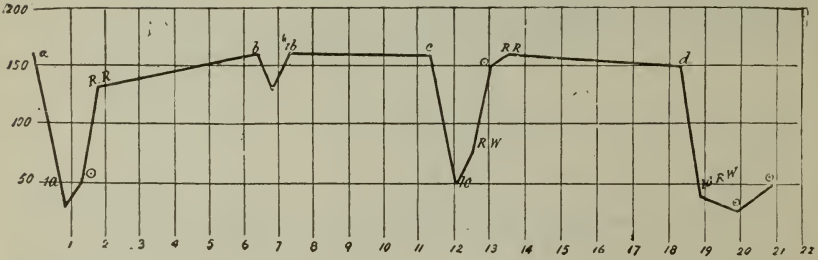
××—injection. *o*—complete anesthesia. *ox*—return of reflexes.

The next experiment with the drug we report in full, both by means of the ordinary tabular method and also graphically.

Experiment V.—Dog, Weight 16.430 Kilos.

Time. Min. Sec.	Dose. Grammes.	Pressure. Mm.	Pulse per Min.	Respiration per Min.	REMARKS.
0.	....	160	210	27	Drug was administered into jugular vein.
1.00	0.3	160	210	27	Injection begun.
1.50	....	30	112	24	Injection ended; conjunctival reflexes weak.
2.20	....	50	92	33	Reflexes lost.
2.50	....	130	112	33	Reflexes return; pulse irregular.
7.30	0.1	158	204	54	Injection begun.
7.50	....	130	180	42	
8.20	.. .	160	162	39	Injection ended.
9.20	....	160	160	30	No disturbance of reflexes.
12.20	0.3	158	210	24	Injection begun.
13.00	....	50	75	39	Injection ended; *pulse-waves large.*
13.30	....	80	.....	21	Pulse cannot be counted owing to irregularity; reflexes weak.
14.00	....	150	303	21	Reflexes entirely gone.
14.30	....	160	303	21	Reflexes return.
19.30	0.3	150	240	27	Injection begun.
20.00	....	40	96	36	Injection ended; *pulse-waves large;* reflexes weak.
21.00	...	30	93	9	Reflexes completely lost.
22.00	....	50	.....	15	Reflexes still gone; pulse cannot be counted owing to irregularity. In twenty seconds after the reflexes returned. Throughout the experiment the pupils were dilated. Animal was afterward killed with ether.

Fig. 2.



Explanation of Figure.

a—First injection (0.3 grms.) begun. 1 *a*—First injection ended. *R W*—Reflexes weak. *R R*—Reflexes returned. ⊙—Complete anesthesia with loss of reflexes. *b*—Second injection begun = 0.1 grm. 1 *b*—Second injection ended. *c*—Third injection begun = 0.3 grm. 1 *c*—Third injection ended. *d*—Fourth injection begun = 0.3 grm. 1 *d*—Fourth injection ended.

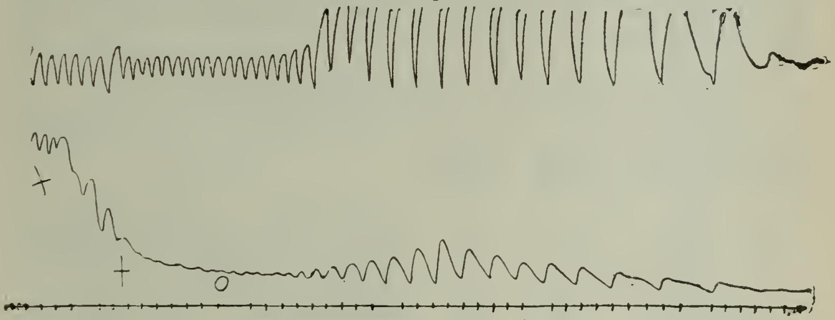
Pupils were dilated throughout the experiment. Reflexes returned twenty seconds after end of tracing. Numbers at bottom represent time in minutes; at side represent millimeters.

The effect of chloride of ethyl upon the respiration is very marked. If the dose has been sufficient to produce anesthesia, the respiration at first is often stimulated, in the extent of the movements as well as in the number per minute. Thus, in one experiment, the normal respiration being 50, the rate became 60; in another, the rate increased from 70 to 80, without, however, any increase in the extent of the movements; a little later in this experiment, the animal still being anesthetic, the number of the respirations fell to 40 per minute, but became nearly quadrupled in size. In still another experiment the respiration before the injection was 60 per minute, and after the injection, during the early anesthesia, was still 60 per minute, but the excursions of the needle connected with the Marey's tambour were three times the size of what they had been before the administration of the drug. In a fourth experiment the respirations before anesthesia were 70 per minute; during the early anesthesia 120 per minute; a few seconds later 100 per minute; the movements of the needle being at the same time enormously increased.

In all our cases the fall of blood-pressure after the injection of chloride of ethyl has been immediate and excessive; the blood-pressure has continued low without rise during the whole period of anesthesia, but has returned rapidly to the normal as anesthesia wore off. The cardiac beats have always at first been arrested, but subsequently have become of enormous size and continued so almost to the end, as is shown in the accompanying reproduction of a tracing. The pulse-waves were also at this time absolutely consonant with and proportionate to the respiratory movements.

Experiment VI.

FIG. 3.



Showing death from chloride of ethyl.
×—× = injection of drug.
O = complete anesthesia.

The tracings which we have reproduced are in strict accord with those obtained in a number of experiments. We believe that our research has demonstrated, first, that the chloride of ethyl is capable of acting as an anesthetic, but that it is eliminated with extraordinary rapidity and that its action is extremely fugacious; second, that the anesthesia which it produces is always accompanied by a fall of the blood-pressure, which is probably at least in part due to direct depressing effect of the drug upon the heart; third, that the action of the drug upon the circulation is in no way dependent upon its influence upon respiration, although it is not certain that the pronounced depression of the blood-pressure is not a factor in influencing respiratory movement; fourth, that at least in the dog, chloride of ethyl produces at first an increase of the respiratory movement either in rate or amount, or more commonly in each respect, but that finally respiration becomes slow, and at last stops almost abruptly; fifth, that usually, if not always, the cessation of heart-beat and the arrest of respiratory movement occur as nearly simultaneously as may be.

As the result of the various experiments which we have made with chloride of ethyl, we believe that the fugaciousness of the action of the drug must interfere with its use as a general anesthetic, and that its depressing effect upon the circulation is too pronounced for it to be a safe anesthetic. It is most probable that if it should come to be employed in practical medicine as an anesthetic, there would be a record of sudden deaths through cardiac failure proportionately even more numerous than those caused by chloroform. On the other hand, our research indicates very strongly that the small amount of chloride of ethyl which is used in producing local anesthesia for dental purposes, has practically no effect upon the human system; any drug that is absorbed into the system being eliminated in the course of a few minutes.

Pental.

With pental we have made a few experiments, both by inhalation and injection into the veins. Though the number of these experiments is not great, they seem to us sufficient to show that pental as an anesthetic acts quickly and fugaciously, but that it will probably be found more dangerous than the chloride of ethyl, and much more dangerous than chloroform. We append a tabular statement of one of the experiments made by inhalation:

Experiment VII.—Dog, Weight 12.345 Kilos.

Time. Min. Sec.	Pressure. Mm.	Pulse Per Min.	Respiration Per Min.	Remarks.
0.	154	138	30	
0.20	.....	.....	...	*Inhalation* of contents of bottle (10 grammes of drug).
1.20	130	96	63	
2.00	140	96	51	Reflexes weak.
3.10	150	150	60	Inhalation of contents of second bottle.
4.10	100	138	54	Complete anesthesia.
6.40	150	60	57	Reflexes returned. Great excitement of animal.
11.40	160	.....	...	Inhalation of contents of third bottle.
12.10	90	102	72	
13.10	90	180	75	Complete anesthesia, but respiration somewhat shallow.
14.10	116	192	69	Reflexes returnad. In four minutes later animal had regained complete consciousness, and showed great excitement. Was afterward killed.

An examination of the record of the experiment just given will show that each time the production of anesthesia with pental was accompanied by a marked fall of the arterial pressure. Thus, in the first inhalation, the pressure had fallen from 154 to 100 mm., when anesthesia was complete; whilst during the second anesthesia the pressure fell from 160 to 90. In each anesthetization the respiratory rate was increased, although the extent of the respiratory movements most of the time were not distinctly above the normal.

In no case have we caused death by the inhalation of pental, but the accompanying tracing records the pulse-wave and the respiratory movements under the influence of a lethal dose of pental (2 grammes) injected into the jugular vein.

The tracing just given accords with our experiments in demonstrating the great effect of pental upon the heart. It shows that the heart was at once affected much more severely than the respiratory centers, that it failed to recover itself, and stopped beating before the arrest of respiration; indeed, full, deep inspiration occurred a half-minute after complete arrest of the circulation.

In conclusion, we are led by our experiments to believe that pental will probably prove to be a dangerous anesthetic, and if extensively used will produce death by cardiac arrest. It is probable, also, that the after-effects of pental, in the human being, would be disagreeable; at least we repeatedly noticed in the dog a peculiar wild excitement directly after the anesthesia from pental had gone off.*

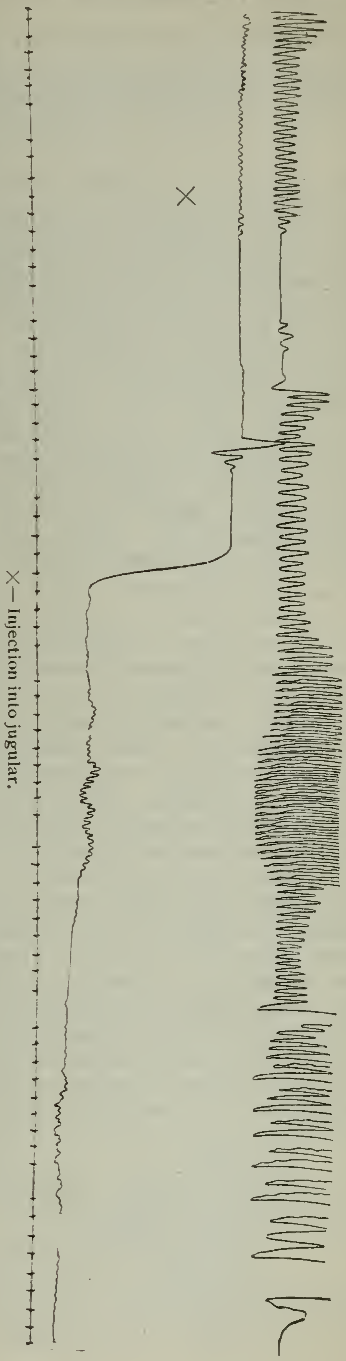


FIG. 4.

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* A report of the further investigation of pental for the DENTAL COSMOS will appear in a subsequent issue.

A STUDY OF THE DEGENERACY OF THE JAWS OF THE HUMAN RACE.

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(Continued from page 433.)

CONSANGUINITY IN ITS RELATIONS TO DEFORMITIES IN GENERAL.

THERE are localities in Europe where intermarriages produce constantly individuals defective in constitution, mind, and limbs.*

The incestuous practice of marrying within the near propinquity had long existed in Spain, with its normal consequences,—dwarfing of the body, and mental degeneration.†

Writers on lunacy attribute lunacy, or innate idiocy, so frequent among Scotch families, to the old national practice of never marrying out of their clan.‡ The most degraded people in Portugal marry within themselves, and each generation is more degraded, which is also true in other countries of Europe.

In a county in South Carolina where the different families intermarry for many generations, the proportion of idiots and deformed is unprecedented.§ Mr. Tylor || has shown that among widely different races in the most distant quarters of the world marriages between relations—even between distant relations—have been strictly forbidden. He is inclined to attribute this to the evil effects of consanguineous marriages having been observed.¶

Interbreeding among animals is much closer than with the human race. All breeders have testified to the deterioration which arises when too close breeding is carried out among animals.

Consanguinity in itself counts for nothing, but acts from related organisms having like constitutions, and being exposed in most cases to similar conditions. Many physiologists attribute the evil exclusively to the combination and consequent increase of morbid tendencies common to both parents; and that this is an active source of mischief there can be no doubt.

The short-horn cattle offer the most striking case of close interbreeding. A high authority ** asserts that many more calves are born cripples from short-horns than from other and less closely interbred races of cattle.†† Even in an unenclosed country like Paraguay, where there cannot be such close interbreeding, there is an occasional introduction of animals from distant localities, to prevent degeneration in size and diminution of fertility.‡‡

In regard to deer, as observed in the parks of England, Mr. Shirley concludes that in some parks, where there has been no introduction of fresh blood, the constant breeding in-and-in is sure to tell to the disadvantage of the whole herd.*

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* Smith.
† Sir W. Scott, "History of Napoleon Bonaparte."
‡ Percy Hunter.
§ Nott & Gliddon.
|| "Early History of Man."
¶ Darwin.
** Mr. Wright, *Journal of Royal Agricult. Soc.*
†† Darwin.
‡‡ Azara, "Quadrupedes du Paraguay."

The offspring of strong spaniels degenerate into weak and diminutive lap-dogs, when bred in-and-in. In the case of pigs, long-continued and close interbreeding does not affect the external form or merit of the young ; but with many of them the general constitution and mental powers were seriously affected ; in some cases idiots were produced.†

That consanguineous marriages have a very demoralizing effect upon posterity, is a well-known fact to all scientists and physicians. The results are very marked in the nobility of Europe. The mental wrecks as well as the physical condition of many of these royal heads are illustrations of intermarriage among near relatives. It is claimed by dentists that excessive or arrested development and irregularities of the teeth are more common among royalty than among the masses. It is very common to find children born of cousins and near relations in this country defective in body and limb. When the brain is involved, we have two factors which assist in producing excessive or arrested development of the jaws. First, direct inherited tendencies, such as a large or small jaw ; and second, defective development due to neurosis. These deformities are very marked among the Hebrews, with whom intermarriages are very common. Thus, in the Hebrew Orphan Asylum, New York city, only seventy-four per cent. of the inmates had normal jaws.‡

INHERITED CONDITION.

Some naturalists seem to entertain a vague belief that the law of heredity applies only to *main* characters of structure, not to *details ;* or at any rate that though it applies to such details as constitute difference of species, it does not apply to species. The circumstance that the tendency to repetition is in a slight degree qualified by the tendency to variation (which is but an indirect result of the tendency to repetition), leads some to doubt whether heredity is unlimited.

First in order of importance comes the fact that not only are there uniformly transmitted from an organism to its offspring those traits of structure which distinguish the class, order, genus, and species, but also those which distinguish the variety. This is illustrated by the fact that a certain variety of apples is grown only on that variety of apple-tree,—a certain kind of dogs produces only that variety of dogs. Illustrations of heredity are divisible into two classes. In one class come cases where congenital peculiarities are bequeathed to offspring. In the other class come cases where the peculiarities thus bequeathed are not congenital, but have resulted from changes of function during the lives of individuals. Breeders of animals believe that minor as well as major characteristics of organisms are inherited, as cases of inherited polydactylism and deficient phalanges. Also defective eyes and other defective organs of sense, peculiarities of skin and hair, are transmitted, as also are an entire absence of teeth or of particular teeth, or anomalous arrangement of teeth. General nervousness, or a bias toward suicide, are also inherited.

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* Mr. Seebright.

† Darwin and Mr. Wright.

‡ Talbot, "Irregularities of the Teeth."

Functional disorders artificially established may be conveyed to offspring. Brown-Sequard demonstrated this in the case of guinea-pigs.

Some may infer that offspring may differ somewhat from each other and from both parents, yet that in everyone of them there must result a homogeneous mixture of the traits of the two parents. A little consideration shows that the reverse is inferable. If throughout the process of development the physiological units derived from each parent preserved the same ratio to each other in all parts of the growing organisms, each organ would show as much as any other the influence of either parent. But we know that no such uniform distribution is possible. It has been shown that in any mixed aggregate of units segregation must go on. Incident forces will tend ever to cause separation of the two orders of units from each other, will integrate groups of the one order in one place, and groups of the other order in another place. Hence there must arise not a homogeneous mean between the two parents, but a mixture of organs, some of which mainly follow one parent, and some the other, and this is the kind of mixture observation shows.* This is shown in cases where a child inherits the small jaw of the mother and the large teeth of the father, or *vice versa.*

We seem to inherit, bit by bit, this element from one progenitor, that from another.†

When a new character arises, it tends to be inherited at least in a temporary and sometimes in a most persistent manner. We may, on the whole, conclude that inheritance is the rule, non-inheritance the anomaly. In some instances a character is not inherited, from the conditions of life being directly opposed to its development.

All races presenting any remarkable peculiarity, such as solid-hoofed swine, Mauchamp sheep, Niata cattle, etc., are instances of the long-continued inheritance of rare derivations of structure. With gout, fifty per cent. of the cases in hospital practice are inherited, and a greater percentage in private families.‡ The unanimity of the belief by veterinarians of all nations in the transmission of various morbid tendencies is surprising.§

All scientists have acknowledged the law of inheritance, so that it is unnecessary here to quote from writers who have touched upon this subject, nor does it seem necessary to bring forward illustrations; but we would like to say here that it does not seem too much to assert that neuroses which are distinctly hereditable are in a large measure due to abnormalities in the conformation of the cranium and jaws as well. With regard to the inheritance of mutilated structures no definite conclusion has been reached. Godron denies that mutilations have been inherited. He says that different races of men have knocked out their upper incisors, cut off joints of fingers, made holes of immense size through lobes of ears or nostrils, tattooed themselves, made deep gashes in various parts of their bodies, and there is no reason to suppose that these mutilations have been inherited.|| However, sometimes a child is born to Sioux Indians bearing these marks.¶ Pitting of smallpox is never inherited, but the author

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* Herbert Spencer, "Principles of Biology."

† Francis Galton, "Natural Inheritance."

‡ Dr. Garrod.

§ Darwin.

|| Ibid.

¶ Dr. Wetherell.

knows of three instances where scars have been inherited. Exostoses on legs of horses, caused by too much walking on hard roads, are inherited.* A soldier, fifteen years before marriage, lost his eye from purulent ophthalmia, and his two sons were microphthalmic on the same side.† A cow lost a horn from an accident, with consequent suppuration, and she produced three calves which were hornless on the same side of the head.‡ A man had the little finger of his right hand almost cut off, and as a consequence it grew crooked. His sons had the same finger of the same hand similarly affected.§ Two men, one of whom had his knee and the other his cheek severely cut, had children born with exactly the same spots marked or scarred.||

Under the old excise laws the shepherd dog was exempt from tax when without a tail, and it was therefore removed; and there still exist breeds of the shepherd dog which are always born without tails.

A man had drooping eyelids that were not congenital, but began to droop while he was an infant suffering from fits. Two of his three children are similarly affected. In all cases in which a parent has had an organ injured on one side, and two or more of the offspring are born with the same organ affected on the same side, the chances against coincidence are almost infinitely great. Even when only a single child is born having exactly the same part of the body affected as that of his injured parent, the chances against coincidence are great.¶

The following is a summary of Brown-Sequard's observations on guinea-pigs:

"1. Appearance of epilepsy in animals born of parents having been rendered epileptic by an injury to spinal cord.

"2. Appearance of epilepsy in animals born of parents having been rendered epileptic by section of the sciatic nerve.

"3. A change in the shape of the ear in animals born of parents in which such a change was the effect of a division of the cervical sympathetic nerve.

"4. Partial closure of the eyelids in animals born of parents in which that state of the eyelids had been caused either by the section of the cervical sympathetic nerve, or removal of the superior cervical ganglion.

"5. Exophthalmia in animals born of parents in which an injury to the restiform body had produced that protrusion of the eyeball. This interesting fact I have witnessed a good many times, and I have seen the transmission of the morbid state of the eye continue through four generations. In these animals, modified by heredity, the two eyes generally protruded, although in the parents usually only one showed ophthalmia, the lesion having been made in most cases only on one of the corpora restiformia.

"6. Hæmatoma and dry gangrene of the ears in animals born of parents in which these ear alterations have been caused by injury to the restiform body near the nib of the calamus.

"7. Absence of two toes out of the three of the hind leg, and sometimes the three, in animals whose parents had eaten up their hind-leg toes, which had become anesthetic from a section of the sciatic nerve alone, or of that nerve and also of the crural. Sometimes, instead of complete absence of the toes, only a part of one or two or three were missing in the young, although in the parent not only the toes, but the whole foot was absent (partly eaten off; partly destroyed by inflammation, ulceration, or gangrene).

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* Dr. Lucas.
† Mr. Sedgwick.
‡ Dr. Lucas.
§ Blumenbach.
|| Prof. Rolleston.
¶ Darwin.

"8. Appearance of various morbid states of the skin and hair of the neck and face in animals born of parents having had similar alterations in the same parts, as effects of an injury to the sciatic nerve."

It should be especially observed that Brown-Sequard has bred, during thirty years, many thousand guinea-pigs from animals which had not been operated on, and not one of them manifested an epileptic tendency, nor has he ever seen a guinea-pig without toes which was not the offspring of parents which had gnawed off their own toes, owing to the division of the sciatic nerve. Direct inheritance of an acquired peculiarity is sometimes observable. A puppy was taken from its mother at six weeks of age, who, although never taught to beg (an accomplishment his mother had been taught), spontaneously took to begging for everything he wanted when about seven or eight months of age. He would beg for food, beg to be let out of the room, and one day was found opposite a rabbit-hutch begging for rabbits. Instances are on record, too, of sporting dogs which spontaneously adopted in the field certain modes of behavior which their parents had learned.*

Horses bred on the grazing farms of the Cordilleras are taught a peculiar pace. This pace is inherited by their descendants.†

"The Caribs flattened the foreheads of their children, and the continuance of this practice through successive generations produced a natural flattening of the anterior part of the head, until the Carib infants were born with flat heads."‡

Hippocrates gives an account of the Macrocephalia, a Scythian race believed to have inhabited the Crimea. He says, "There is no other race of men which have their heads in the least resembling theirs. At first, usage was the principal cause of the length of their heads, but now nature co-operates with usage. They think those the most noble who have the longest heads. It is thus with regard to usage. Immediately after the child is born, and while its head is still tender, they fashion the head with their hands, and constrain it to assume a lengthened shape by applying bandages and other suitable contrivances, whereby the spherical form is destroyed, and it is made to increase in length. Thus, at first usage operated, so that this constitution was the result of force; but in the course of time it was formed naturally, so that usage had nothing to do with it."

Dr. Harrison Allen says,§ "Lectures on correlation of structure, on vegetative repetition, on the relation existing between phyllogenetic and teratological processes, could be given, as well as the study of the laws of heredity, especially in attempting to answer the question of the transmittal of acquired characters. The teeth are so responsive to the constitutional peculiarities of the individual that their peculiarities can be seen and readily detected. The method of procuring accurate impressions can be applied, and the plans of preserving the form of teeth can be easily accomplished.

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* Francis Galton, "Natural Inheritance."

† Prichard, "Natural History."

‡ F. M. Goodall, "Remote Effects of Fœtal Brain-Injury in Labor; or, Why We are Right-Handed," from Tyler Smith's Lectures on Obstetrics.

§ "Addresses on Anatomy."

"As is known to the zoölogist, the parts involved in the act of mastication are important in the classification of the mammalia, the slightest departure in the form, number, position, and rate of development of the teeth being for the most part correlated with other variations in the economy, while the shapes of the lower jaw and of those portions of the skull that afford surfaces for attachments of the masticating muscles are of importance. No structures of the body resemble the teeth in the character of their response to morbid impressions ; no other organs are arranged in progressive series ; and no other than these are evolved after birth. Hence the effects of disease and accidents to which the teeth are subjected are sure to be recorded in the shapes of the crowns and roots.

"If the student of heredity were to have placed at his disposal a collection of the casts of the permanent teeth of three generations,—that is to say, of the parent of the subject, the subject himself, and the children of the subject,—and if a clinical history were secured of the diseases and accidents that these persons had incurred, a tenable argument might be established as to the significance of the contrasts or resemblances in the forms of the teeth. Thus, if three generations were expressed by the letters A, B, C, and if B is the subject of an acquired character (let us say from scarlet fever or measles), the new form of structure seen in the second and third molars may be transmitted to C. But in order to prove this it is necessary to know the peculiarities of these teeth in A. Hence the teeth of the ancestors and descendants of the person who exhibits the acquired character must be known. A somewhat similar plan of observation could be made on the teeth of the lower animals. It is strange that those teeth with endless pulps, in which growth is rapid and interference with their relations causes permanent records to be made in malformation, should not have been used in studies of nutrition."

Disuse of the Jaws producing Arrest of Development, Early Decay, and Loss of the Teeth.

In investigating the subject of the effects of disuse of the jaw upon its development, one's attention is naturally directed to the results arising from disuse of any organ of the body, and I will therefore present to the reader some data collected by me upon this exceedingly interesting subject.

The disuse of the jaws as the weapon of attack, evident in the large canines of the male anthropoid apes, exercised an influence in reduction of the size of the jaw itself as well as on the teeth. The Neanderthaloid jaw is a type of jaw from the standpoint of the anthropoid apes, and the few weapons of the Neanderthal types of man indicate that biting, as among rowdies of to-day, played no small part in battle, and particularly in duels for female favor. With the development of weapons of offense this employment of the jaw rapidly fell into disuse. The physiological factors underlying this element are similar to those detailed.*

The chief agents in causing organs to become rudimentary seem to have been disuse at that period of life when the organ is chiefly used (and this is generally during maturity), and also inheritance at a corresponding period of life. The term disuse does not relate merely to the lessened action of muscles, but includes a diminished flow of blood to a part or organ, from being subjected to fewer alterations of pressure, or from becoming in any way less habitually active.

Rengger attributes the thin legs and thick arms of the Paraguay Indians to successive generations having passed nearly their whole lives in canoes, with their lower extremities motionless. Other writers have come to a similar conclusion in analogous cases. It is asserted that the hands of English laborers are at birth larger than those of the gentry.†

From the correlation which exists, at least in some cases, between the development of the extremities and of the jaws, it is possible that, in those who do not labor much with their hands and feet, the jaws would be reduced in size from this cause. That they are generally smaller in refined and civilized man than in hard-working men or savages, is certain ; but with savages, as Herbert Spencer has remarked, the greater use of the jaws in chewing coarse, uncooked food would act in a direct manner on the masticatory muscles, and on the bones to which they are attached.‡

It is familiar to everyone that watchmakers and engravers are liable to be short-sighted, while men living much out of doors, and especially savages, are generally long-sighted. Short-sight and long-sight tend to be inherited.§

It is a singular fact that sailors are inferior to landsmen in their mean distance of distinct vision. This is probably due to the fact that the ordinary range of vision in sailors is restricted to the length of the vessel and the height of the mast.||

The inferiority of Europeans, in comparison with savages, in eyesight and in other senses, is no doubt the accumulated and transmitted effect of lessened use during many generations.¶ Europeans who have been brought up and spent their whole lives with the wild Indians do not equal them in the sharpness of their senses. The cavities in the skull for the reception of the several sense-organs are larger in the American aborigines than in Europeans. This probably indicates a corresponding difference in the dimensions of the organs themselves.**

The Mongolians of the plains of Northern Asia are characterized by great breadth of the skulls across the zygoma. This follows from the highly-developed sense-organs.†† In the lower jaw of many pigeons the articular surface is proportionably smaller than in the rock pigeon, and the vertical diameter, more especially of the outer part of the articular surface, is considerably shorter. May not this be accounted for by the lessened use of the jaws, owing to nutritious

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* Darwin.

† Walker.

‡ Darwin.

§ Ibid.

|| B. A. Gould.

¶ Darwin.

** Rengger and Blumenbach.

†† Prichard.

food having been given during a long period to all highly-improved pigeons?*

One of the chief factors conducive to arrest of development of the jaws, and one which acts in a threefold ratio, is the want of maxillary exercise. This operates in the following manner: first, by lack of exercise the blood, which nourishes the bones, is not carried to the part; second, the blood does not carry sufficient material to the teeth, hence the enamel formed is defective, and as a result we have early decay; third, by lack of lateral motion the mechanical development of the alveolar process is wanting. It has been shown that the jaws of to-day are not so large as those of pre-historic races, and that they are steadily growing smaller. The early races lived upon coarse food such as roots, herbs, corn, and uncooked meats. This coarse food required considerable mastication in order to be prepared for the chemical changes which are necessary before assimilation can take place. As a result of use, the muscles of the jaw were dense and hard, and when contraction took place they stood out upon the sides of the head like large cords. The bones were well developed, they were also of dense and hard structure; the processes for the attachment of muscles were prominent and large, and the teeth were large and set deep in the alveolar process.

These physical conditions are noticeable only in those persons who use their masticatory apparatus a great deal, as tobacco-chewers, and are also seen in public speakers and singers. To such an extent has the art of mastication become obsolete that the food is now swallowed whole, or in a semi-masticated condition. The muscles have become flabby, the jaws more slender, and the processes for the attachments of muscles are almost if not quite obliterated. The difference in the size of the superior and inferior maxillæ is a marked illustration of the result arising from the use and disuse of these bones. It is a singular fact that the greater number of irregularities of the teeth occur upon the upper jaw; when they are found upon the lower jaw, the irregularities are due to local causes.

The upper jaw is a fixed bone, and the blood-supply is small from a lack of stimulus,—*i.e.*, movement, and hence arrest of development is marked. On the other hand, the lower jaw being movable, more blood flows to the part, which thus becomes much more developed.

As a further illustration of the results arising from the use and disuse of the upper and lower jaws, I desire to direct attention to the following fact. It is known to all dentists that the teeth upon the upper jaw are more subject to decay than those upon the lower jaw, although the environment of the teeth upon the lower jaw, especially the bicuspids and molars, renders them more subject to decay than those upon the upper. Tomes says,† "The different teeth are not equally subject to the attacks of caries. In the first place the upper are more frequently attacked than the lower,—according to Dr. Magitot in the proportion of 3 : 2,—whilst the yet more comprehensive tables of Dr. Hitchcock give the ratio of 1.9 : 1, or very nearly two to one." A disease which is becoming a very common one among our people, and which is in a great measure due to want of proper mastication, is that called "Riggs's disease." The first symptom noticed is a slight redness along the margin of the gums. These afterward become swollen and bleed upon the slightest touch; then follow inflammation of the peridental membrane, absorption of the alveolar process, and consequent loss of the teeth. To such an extent has this disease become prevalent, that at least ninety-five per cent. of all people over twenty-five years of age are thus more or less afflicted. Twenty-five years ago this disease was not considered of any importance by the dentist, due no doubt to its comparatively rare occurrence. To-day it is giving him more trouble than decay of the teeth, because a dentist is frequently called upon by patients who have a partial or full set of natural teeth which are quite loose in the jaw; aside from this they are sound and healthy, and after a certain stage in the development of the disease nothing can be done to save them; while on the other hand, if decay takes place, by constant filling they can be preserved.

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* Darwin.

† "Dental Surgery," p. 273.

These conditions are brought about by a change in the mode of living. Man first began to reduce food by cooking, in order to make it more palatable. Roots, herbs, and grains were more finely divided by mechanical means, and thus the labor of the jaws in mastication was lessened. Since these early beginnings man has studied the art of the preparation of food, and to-day it is prepared in such a manner that in most cases mastication is unnecessary. While these changes in the preparation of the food have taken place, man has been modified not only as regards his sense of taste and appetite, but also in the structure of muscles and jaws. "Surely," says Mr. Carter, in the *British Journal of Dental Science*, in speaking of the jaws and teeth, "some law of God and nature has been outraged to bring upon our children so dire an affliction." To such an extent has the sense of taste and refined appetite become cultivated, that at the present day it requires all the skill that cooks are able to display to produce dishes free from all of the peculiarities presented in the early days of cooking. Thus all coarseness has been removed from food, and by the new processes made possible by mechanical as well as scientific discoveries, cereals are reduced to the finest of flour, while the hulls, which contain the phosphates essential to bone-building and also furnish the material for mechanical grinding by the jaw, are entirely excluded. There seems to be a growing inclination on the part of the human race to use that class of food which requires little if any mastication. This evolution will eventually result in the adoption of new modes of acquiring and preparing food,—viz: the manufacture of foods in the chemical laboratory. Indeed, at the present time many forms of food comprising all the nutritive elements necessary to sustain life for the sick, are being prepared in the laboratory. If these foods prepared in a liquid form are sufficient for the nourishment of children and the sick, it seems reasonable to expect that they will soon become the exclusive food of the laboring class, and indeed of all classes. Such being the case, the art of mastication, which is now at a very low ebb, will then become entirely lost.

I have shown that when the teeth push their way into place they crowd one another laterally. By so doing the dental arch enlarges, and the alveolar process develops and grows about the teeth. The lateral movement of the lower jaw in the act of chewing assists greatly in producing the enlargement. The constant movement of the lower against the upper teeth causes them (in many cases of irregularities) to arrange themselves in their proper places. The teeth of tobacco-chewers are rarely irregular. Thus we see that the result of the proper mastication of food has brought about arrest of development of the jaw, and consequent irregularity of the teeth.

Extraction of the Permanent Teeth.

To my mind there is no one cause that has produced such a baneful influence upon the jaws of the present generation as that of dentistry. The constant extraction of the permanent teeth from one generation to another before the osseous system has been fully developed, is developing a race of individuals with small jaws. In my investigations during the past fifteen years for the cause of irregularities of the teeth, I have become convinced that the jaw-bone proper and the alveolar process are two separate and distinct structures. The manner of their development and their functions are independent of each other, and therefore they should be regarded as separate and distinct bones.

The maxillary bones proper are composed of dense compact tissue, and are so constructed as to resist force. They develop from four centers of ossification and eventually blend into one bone, the superior maxillary bone. This bone depends upon the nerve-centers and blood-supply for its development, and is subject to influences such as hereditary taint, constitutional and local lesions, early or late ossification of cranial bones and sutures, for its size and the position it will occupy in relation to other bones of the cranium. After it has developed it remains throughout life, differing thus, as we shall see, from the alveolar process. On the other hand, the alveolar process is made up of soft, spongy tissue; for its development, shape, and size it depends entirely upon the teeth and not upon the jaw. When the teeth erupt, the alveolar process builds itself up about them. If the teeth are extracted or do not develop, no alveolar process is present. The alveolar process develops and is absorbed twice in the life of an individual, provided the second set has been removed. If a tooth of the first or second set is extracted, no matter from what part of the arch, and all the other teeth remain, the alveolar process will absorb at that particular point.

If a tooth erupts inside or outside of the arch, the alveolar process will assume the shape of the contour of the teeth. If the jaw is arrested in its development and the long diameters of the teeth are greater by from one-fourth to one-third than the circumference of the jaw, then as the teeth erupt and find their way into position by wedging themselves in between each other, the diameters of the teeth being greater than the circumference of the jaw, the alveolar process builds itself up about the teeth and upon the outer surface of the jaw. On the other hand, if from constitutional causes the jaw-bone proper should become excessively developed and the long diameters of the teeth should be considerably smaller than the circumference of the jaw, then in the greater number of cases the teeth will remain close together and the alveolar process will develop among the teeth, but upon the inner aspect of the jaw. It stands to reason, then, that the teeth in their relation to one another are like the staves in a barrel or the stones of an arch; each depends upon its neighbor to hold the barrel or arch together; remove one, and the barrel or arch will collapse. Remove a tooth before the twenty-second year, or before the bones and alveolar process have obtained their growth, and the arch or alveolar process will fail to be developed. It will be seen by this argument that the size which the alveolar process will attain is not due to a physiological development, but to a purely mechanical development.

Up to within ten years ago, if teeth decayed to such an extent that they could not be filled, the only thing to do was to extract them; this was invariably done to supply their place with artificial ones.

Sixty years ago dentistry was not considered a part of the healing art. Many unprincipled persons who had been engaged as watchmakers, printers, barbers, and the like had taken up the practice of dentistry for the money that was in it. They roamed around the country extracting the natural teeth and inserting artificial ones, claiming for their patients that nice white "store-teeth" were much better than the natural ones, because they did not decay and ache, and therefore the person would not suffer or experience any inconvenience on that account.

To such an extent had this become a fad, that I can remember, when a mere boy in Massachusetts, only thirty years ago, it was a common occurrence for young girls, as soon as the front teeth commenced to decay, to go to a dentist in Boston and have all their teeth, sound as well as decayed, extracted, and come home with a brand-new set of beautiful white "store-teeth." Even at the present day, in all parts of the world, there are still to be seen these same charlatans, ready at all times to destroy parts of the organism which God has given us for the purpose of properly masticating our food.

About thirty years ago dentists began to notice that irregularities of the teeth were becoming more common, and if they did not erupt in a fairly normal manner there would be quite a protrusion of the anterior teeth. This subject was discussed in dental meetings, and a remedy was naturally sought for. After considerable controversy upon this subject, it was thought best to remove the first permanent molars, because, as they were the first teeth of the permanent set to erupt, they were also the first to decay. If these were removed early, sufficient room would then exist for the rest of the permanent teeth to come into their proper place. To such an extent had this fad become universal, that in some communities at the present time dentists are in the habit of removing the sixth-year molars, sound as well as decayed. I am told there are communities in this country where it would be impossible to find a single individual with a first permanent molar.

While traveling in England last summer, I was informed by dentists practicing both in England and on the continent that it was the proper thing to remove these molars for the purpose of preventing irregularities of the teeth, and the students in English dental colleges are taught this method.

In reply to one of my letters inviting a dentist of Glasgow to assist me in making examination of the mouths of his patients, he said, "I am sorry to tell you that I am unable to procure the measurements you desire. It is rare indeed to find the sixth-year molars in the mouths of persons at the age of twenty-five, living in Glasgow, especially of Scotch people, which I presume you desire."

Even in this enlightened age and in this country, where dentistry has developed *par excellence*, an article appeared in one of our dental journals* in which the author says, "It is the purpose to show that experience proves that its (first permanent molar) timely removal redounds to the benefit of the other teeth of the permanent set, and in the large majority of instances to the comfort of those we serve;" and again he says, "The jaws of the present generation do not seem to be large enough for the accommodation of thirty-two teeth. Witness the large number of cases of irregularities of the teeth which we see in people of our time, when the jaws have to be widened or enlarged to accommodate the teeth, or when the teeth have to be extracted in order to make room;" and yet the doctor is in my opinion advocating one of the most prolific causes of the production of small jaws,—that of the removal of the first permanent molar,—and is teaching by his influence and article the advocacy of this pernicious habit. Why not advocate the removal of one eye or one ear, because, by so doing, the patient who is liable to become near-sighted or deaf may be able to concentrate sight or hearing into the other organ?

(To be continued.)

THE PATHOLOGY OF THE TRIFACIAL NERVE.

BY ARTHUR B. FREEMAN, M.D., D.D.S., CHICAGO, ILL.

(Read before the Chicago Dental Club, March 28, 1892.)

MR. PRESIDENT AND GENTLEMEN: The subject which I am to present to you this evening—the pathology of the fifth pair of cranial nerves—is not a new one, but one as old as the healing art itself, and therefore at the outset the essayist will disclaim originality or claims to the presentation of anything new, but will endeavor to offer for your consideration an exhaustive compilation of matter and facts brought together from various sources, and perhaps in a measure clothed in new forms but limited to the etiology, pathology, symptomatology, and diagnosis of the subject. This is also a subject of vital importance to every practitioner of dentistry, as he should not only be able to intelligently diagnose and treat these pathological conditions when arising in practice, but also be able to avoid causing nerve-irritation by unduly prolonged dental operations upon those susceptible of intense nervous shock, which may provoke lesions of serious proportions.

As the pathological conditions in any part of the human economy cannot be correctly understood and the symptoms duly appreciated, for the nicest discriminations and differential diagnoses, without an accurate knowledge of the anatomy of the affected and associate parts, it will not be amiss for me to briefly recall the anatomy and ganglionic communications of this nerve.

The fifth nerve, it will be remembered, has a deep and extensive origin, not alone from the middle nucleus at the level of the surface attachments, but also by descending fibers from beneath the corpora quadrigemina, and by ascending fibers from the medulla oblongata.

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* *International Dental Journal*, 1891.

Here in the medulla these fibers are connected with sensory nerve-cells, forming a tract of sensitive gray matter continuous with that from which the posterior cervical roots arise ; the cutaneous distribution of the nerve is continuous on the head and neck with these cervical roots, and the central gray matter similarly continuous. This enables us to understand the radiation of pain from one nerve to another, the nucleus of the motor root being at the level of the origin of the nerve from the pons.

The Gasserian ganglion lies in a depression near the anterior aspect of the apex of the petrous portion of the temporal bone, just within the cranial cavity, and thence the three divisions of the fifth pass from the cavity, the first through the narrow portion of the sphenoidal fissure to the orbit, the second through the foramen ovale, and the third through the foramen rotundum, to make their exit into the spheno-maxillary fossa.

The orbital branch passes to break up in a peripheral distribution in the integument and muscles of the forehead, anterior occipito-frontalis, upper eyelid, bridge and tip of nose. The superior maxillary trunk supplies the lower eyelid, cheek, anterior temporal region, upper lip, upper teeth, part of the superior pharynx, tonsils, soft palate, uvula, and roof of mouth. The inferior maxillary division is distributed to the posterior temporal, upper and anterior portion of the ear, auditory meatus, lower portion of cheek adjacent to the mouth, the lower lip, chin, lower teeth and gums, the tongue and mucous membrane of the mouth, and salivary glands. The function of taste in the anterior portion of the tongue is furnished by the lingual, a branch of the third division. The motor portion of this latter division supplies motion to the muscles of the lower jaw, the temporal, masseter, interior and external pterygoid, mylo-hyoid, and posterior belly of the digastric.

The communications of the fifth nerve are numerous, and some of them are of considerable importance. The ophthalmic division has connected with it the ophthalmic ganglion, situated in the posterior portion of the orbit. It receives communicating branches from sensory, motor, and sympathetic trunks, and its branches of distribution are supplied to the radiating muscles of the iris. Connected with the superior maxillary division is Meckel's ganglion (or the spheno-palatine), situated just below the spheno-palatine foramen of the palate bone, and in the spheno-maxillary fossa. Its motor root is derived from the facial through the vidian ; its sensory root from the fifth ; and its sympathetic root from the carotid plexus. Its branches of distribution are ascending, to the orbit ; descending, to the palate ; intrnal, to the nose ; and posterior branches, to the pharynx. Connected with the inferior maxillary division of the nerve we have the otic and submaxillary ganglia. The former (otic) is situated immediately below the foramen ovale ; the latter above the deep portion of the submaxillary gland, near the posterior border of the mylo-hyoid muscle. Like the foregoing ganglia, they receive sensory, motor, and sympathetic nerve communications, and give off branches of distribution. Together these four ganglia and their communications make up the entire cephalic portion of the sympathetic system. Thus we have a most intricate anatomical arrangement and inter-communication between this great sensory nerve of the head, through the sympathetic with other cranial nerve-trunks, which enables us to understand the complex reflex conditions often present.

In this connection it should be remembered that many of the branches from the main nerve-trunks pass through and along bony canals and fossæ, perforate bony plates, and terminate in peripheral expansions of tissue within unyielding walls, where pressure from exostosis, congestion, or foreign bodies would produce irritation, which might be exhibited as local pain or reflected to a distant part and be exhibited in another form.

The pathological conditions implicating the trifacial may be classified in two divisions according to the location and origin of the lesion, namely, central and peripheral : those of the former being paralysis, including intra-cranial tumors affecting the origin of the nerve-roots, and idiopathic neuralgia ; while those of peripheral origin are neuritis, symptomatic neuralgia, migraine, pulpitis, pericementitis, infantile eclampsia of dental origin, and some other minor affections.

Eminent authorities cite the causes of paralysis of the fifth nerve to be—

1. Disease within the pons, hemorrhage, softening, tumors, sclerosis injuring the tissue at the level of the origin of its nerve-roots.

2. Disease at the base of the brain, especially by tumors, chronic meningitis, and carious bone.

3. Predisposing causes situated in the course of each of the three divisions. The first, in the wall of the cavernous sinus from foreign growths, aneurism of the internal carotid and also within the orbit from foreign growths, such as orbital cellulitis or inflammations ; the second and third divisions in the spheno-maxillary fossa, which is often invaded by tumors, either osseous or from the parotid gland.

4. Traumatic injury, especially punctured and bullet wounds, through the mouth and nose.

The chief symptom is the loss of sensation throughout the distribution in severe cases, and loss of sensation in the skin in milder cases,—universal when caused by tumor in the brain-center, and confined to areas of distribution when confined to any particular division. The loss of sensation is usually preceded by sensations of irritation, sharp, darting, burning pains, referred to the region of distribution, closely resembling those of neuralgia and often accompanied by tender points in the course of the nerves. If the disease is rapid, these symptoms are absent, and anesthesia is the first symptom. Tactile sensibility is usually lost first. The muscles of the face are insensitive, but are not weakened, though frequently the action of the muscles is slower in responding to irritation. The mucous membrane becomes insensitive, and there is a lack of sensation and reflexes when the conjunctiva is touched. Odors cannot be detected perfectly. Ammonia or snuff fail to irritate the mucous membrane of the nose at first application. Anesthesia of the mucous membrane of lips, mouth, and tongue up to the middle line. Furred tongue on side affected, and loss of taste, are frequent symptoms. The secretion of the lachrymal and salivary glands is lessened, and therefore a dry eye and mouth. Inflammations of the eyeball are frequent ; the cornea becomes cloudy, then opaque, and ulceration follows, probably due to irritation of the fifth nerve and not to foreign bodies. Herpes zoster is a frequent symptom, accompanied by much pain and hyperesthesia. The motor symptoms are a lack of masticatory force, recognized by placing fingers on the temporal and masseter and allowing the teeth to be forcibly closed, when feebleness or absence of contractions will be present. When the lower jaw is depressed, it deviates slightly toward the affected side, because in the depression the external pterygoids draw the condyles forward, and this movement occurs only on the unaffected side. Ultimately the patient is unable to open the jaws to the full extent. The differential diagnosis from neuralgia is easy when complete paralysis is present, and difficult when the disease causes only sensory symptoms not unlike neuralgia. Persistent hyperesthesia of the skin is more marked in paralysis than neuralgia, and the pain radiates less frequently to other nerve regions of distribution. Loss of taste is an important differential symptom from neuralgia, also absence of irritation on application of ammonia and other pungent drugs, sensitive conjunctiva, anesthesia, and absence of motor symptoms.

Neuralgia is defined as severe pain produced by irritation of a nerve, or by sympathetic action, with inflammation of surrounding tissue ; a disease chiefly of debility, overwork, and general depression. When occurring in the head it is termed tic douloureux. Two classes of neuralgia are distinguished : "symptomatic," in which the pain is a symptom of organic disease of the nerve- or brain-tissue, and "idiopathic," in which the malady consists only of functional disturbance.

The term neuralgia should be restricted to the idiopathic variety, as it is manifestly unreasonable to describe inflammations of nerve- or brain-tissue as "neuralgia" when it causes much pain and few other symptoms, and as "neuritis" when other symptoms predominate over pain. But a distinction of the two forms of nerve pain is often very difficult in practice. Sciatica has been described as neuralgia, while the pain is generally the result of neuritis.

In ascertaining the clinical history of neuralgia, it is of great importance that only cases should be used in which the primary organic lesion of the nerve-trunk or centers can be excluded with reasonable confidence. This limitation does not, however, exclude peripheral organic lesions, as pulpitis and pericementitis. Such cases are classed among neuralgias, and are very different from those in which a primary lesion of a nerve-trunk causes local and limited pain. Essentially, neuralgia is a disease of adult life, being rare before puberty, also rare in extreme old age. Women are more prone to the disease than men, and frequently it is hereditary. It occurs in so-called "eccentric" or peculiar temperaments, usually of the nervous diathesis, or those who are anemic, excitable, anxious, worrying, and often irritable.

Among the exciting causes of neuralgia, impairment of the general health takes the first place, either from overwork, mental or physical, over-lactation, prolonged fatigue, over-stimulation of the eyes, severe emotion, traumatism, exposure to cold, irritation of the nerves near the periphery, alcoholism, malaria and other toxic influences. The one great symptom is pain, spontaneous, paroxysmal, unilateral or bilateral. The pain is never constant in degree ; there are paroxysms, with periods of complete freedom, or slight continued pain with intense exacerbations. Sometimes the pains are described as "darting," "stabbing," "boring," "burning," etc. Usually the pain is referred to some deeply-seated tissue, and not superficial. The duration of the attack varies from a few moments to a few hours, while the intervals vary from a few hours to a few months. Increased sensitiveness of the skin along the nerve-trunk or over areas of distribution is nearly always present.

Few questions have been the result of more controversy than the exact pathology of this disease, and your essayist finds himself in the position of the dental student who remembered *only* that the professor stated that *all disease* was caused by an irritant. The problem of its pathology seems to be, What is the nature of nerve-pain without a known organic cause? First, spontaneous pain, and secondly, hyperesthesia are the symptoms of neuralgia. Spontaneous pain means the action of sensory nerve elements apart from local external stimulation. The pain corresponds to certain peripheral nerve-areas, and therefore we must look for its cause to the elements constituting its peripheral nerve-structure. These are the nerve-fibers, the peripheral end organs, and the central cells with which the fibers are connected. To which of these can be ascribed a functional activity independent of external stimulation?

There is no evidence to show that, apart from external stimulation, the nerve-fibers are capable of independent evolution of nerve-force, nor that the peripheral end organs of the sensory nerves are capable of such independent function. We are thus reduced, by exclusion, to the central terminations of the nerve-fibers as the source of pain in idiopathic neuralgia, as these central nerve-cells, so far as known, are the only elements capable of the independent evolution of nerve-force. The conclusions of physiologists show that the sensation of pain depends on a special function of nerve-cells, there being separate structures for the sensation of pain and touch, and it is claimed there is no difference between the structure of sensory and motor filaments,—that one may do the work of the other,—all depending on the central connection or their nerve-cells. We must therefore regard the pain of idiopathic neuralgia as central, as due to the spontaneous activity of the cells that constitute the central termination of the nerves. If we regard this form of neuralgia as a result of over-action, the discharge of the central nerve cells, to what is this over-action and discharge due? Probably to hyperemia of the center and dilatation of the vessels, as vaso-motor disturbance means deranged action of the vaso-motor center for the territory.

Intracranial tumors, while not a positive pathological condition of the fifth nerves, is a frequent central pathological cause of degeneration affecting the origin of the nerve-roots themselves, and should be briefly alluded to. The varieties are tubercular growths, glioma, sarcoma infrequently, syphilitic growths, fibroid and bony tumors. Etiological evidence shows that males are twice as liable to be afflicted as females, owing to traumatic influences, and especially with tubercular and gliomatic affections. One-third of all cases occur before the twentieth year. Tubercular and syphilitic growths depend upon diathetic influences, as in most cases of tubercular tumors there is a family history of phthisis, while syphilitic growths are not unknown in the inherited form, but occur chiefly in the acquired disease from five to twelve years after the initial lesion. Tubercular tumors comprise one-half of the entire number, and occur in the form of solid, firm, rounded masses having little resemblance to tubercle in the miliary form. They vary in size from a marble to a hen's egg. The outer portion is softened and the inner cheesy, and they are easily detached from the brain-tissue, which they compress, causing atrophy of its substance. They invade *all* the intrinsic tissues of the brain. Syphilitic growths, or gummata, vary in size from a small marble to a chestnut, and are irregular or nodular ; their consistence is firm but not uniform, having soft white spots separated by fibrous septa. The adjacent brain-tissue is softened. They are most frequently located in the cerebral hemispheres or pons, being superficial and attached to the pia mater. The sarcomatous group consist of round, oval, or spindle cells surrounded by more or less intercellular and fibroid tissue. Some of them infiltrate without displacing the brain-tissue, and have no sharp outline ; others displace rather than invade the brain-tissue.

Without further detail of the pathology of these tumors, it can be stated that the symptoms are general and local. The general symptoms are headache, vomiting, giddiness, general convulsions, and optic neuritis. The local symptoms are affections of sensibility of the cranial nerves, a result more or less direct of the existence of a tumor in a certain situation. Headache is the most constant symptom, with severe paroxysms ; the pain is sometimes dull, acute, stabbing, tearing, or boring, in the region of the fifth nerve. Mental disturbance, stupor, and coma are common terminal symptoms. The "fifth" is said to be almost constantly affected in tumors of the middle fossa of the skull and the pons.

Among the second classification of the diseases affecting the "trigeminus" we will first consider neuritis. The nerves seem to be peculiarly exempt from the inflammatory process, as in suppurative inflammations they are found comparatively intact, while the surrounding tissues are infiltrated with pus. Nevertheless both acute and chronic neuritis have been satisfactorily proven of late years. In acute neuritis the nerves are swollen, reddened, and more succulent than normal. Microscopic examination reveals hyperemia, ecchymoses, serum, and migrated white blood-corpuscles in the interstitial tissue between the nerve-fibers. Large granular corpuscles may also be present, while the fibers may be little changed, or their medullary sheaths may be broken up and the fibers undergo degenerative atrophy.

Chronic neuritis is characterized by increase of interstitial tissue and consequent compression and degeneration of the nerve-fibers. The nerve is firmer than normal, usually diminished, and of a grayish color. This inflammation may affect only a small portion of the nerve course, or may extend from the primary lesion, either centrally or peripherally.

Neuritis seated in a sensory nerve gives rise to pain extending along its course, perhaps to the periphery, and subsequently there may be anesthesia.

Of symptomatic neuralgia very little more need be said. It is, as already stated, a pathological condition due to neuritis of nerve- or brain-tissue, and occurs most frequently in one of the three divisions of the fifth nerve, but usually occupies two divisions simultaneously and the three very seldom. The affection in the first division is felt chiefly in the supraorbital branch, while the pain radiates from the supraorbital notch over the anterior half of the head, eyeball, eyelid, and side of the nose. Points of tenderness are supraorbital, palpebral, nasal and ocular, within the eyeball. This ocular pain occurs independently of defective refraction, and may exist alone or be accompanied with pain in associate parts. In neuralgia of the second division the pain radiates from the infraorbital foramen over the cheeks and side of the nose. When the third division is affected the pain extends over a large area, occupying the parietal eminence and temple, the ear, lower jaw, and tongue, while the points of tenderness cover these regions. Vaso-motor disturbances are noticeable, flushing, sweating, and salivation. Radiation of pain is marked, originating in one division, passing to a second and frequently being reflected to the brachial plexus on the same side. The radiation of pain is ascribed to the extension of the "central discharge" to adjacent nerve-centers, but the reflex pain is that pain which exists only at a distance from its cause. Pathological conditions inducing this form of neuralgia may be exostosis of the bony plates at the foramina of exit, tumors along the course of the nerve, caries of teeth, or traumatism.

Migraine or paroxysmal headache is an affection characterized by paroxysmal nervous disturbance, of which headache is the most constant element. It is commonly accompanied by nausea and vomiting, and often preceded by sensory disturbance, especially disorder of the sense of sight. The pain is frequently on one side of the head, and thus the term "hemicrania" or "sick-headache" has been applied to the malady. Those of high intellectual development are, as a class, those who most frequently suffer, but the disease has a larger percentage among females than males. The periods of life most susceptible to the affection are late childhood, puberty, and early adult life. Migraine has strong hereditary tendencies, as in more than half the cases inheritance can be traced, and it is usually direct. Influences which depress and weaken the nervous system directly or through the general health, such as excessive brain-work, over-fatigue, anemia, over-lactation, etc., are productive in exciting the paroxysms, as well as excitement, dietetic errors, and over-use of the eyes. The essential symptom is headache of a paroxysmal nature, nausea and vomiting, some disturbance of vision, frequently vaso-motor derangement, causing flushing, perspiration, etc. The headache varies much in degree, but is seldom trifling. It usually has a characteristic course, uniform in the same patient; it begins gradually, slowly increases to a considerable degree of intensity, and after a variable time subsides, sometimes slowly, sometimes rapidly. The nature of the pathological condition is rather a matter of inference than demonstrated morbid change, as no anatomical change is known to underlie the phenomena. Two chief theories are held regarding the pathology or origin of the attacks. One is based on the disturbed circulation in the brain, due to the dilatation of the arteries by the vaso-motor nerves, causing increased arterial tension and increased tension on the membranes to which sensory filaments of the fifth are supplied. According to the other theory of the disease, the derangement is in the central nerve cell. It is as difficult to explain the primary derangement of the cells of the vaso-motor and sympathetic centers as it is to explain that of the cells in the sensory centers of the brain, but we know that the function of the pneumogastric is secondarily affected in the later stage of the attack, which in a measure substantiates the latter theory.

Infantile eclampsia occurs in young children with great readiness, and has many causes. The special liability of infants to convulsions is probably due to the imperfectly developed condition of the nervous system. It is probable that functional capacity is only fully developed after structural development of the nervous system is complete. By far the most potent cause of this disease is "rickets," and the period at which rickets chiefly occurs is between the sixth and eighteenth month of life. This corresponds with the most active period of dentition, and it is very probable that in many cases this process of dentition has its influence, as it involves irritation of the sensory nerves and so may excite the convulsion. Symptoms of infantile convulsions are often preceded by signs of irritation of the nervous system. The child is restless and irritable, the expression of the face changes, and there may be a little twitching of the mouth at times. The actual attack usually comes on suddenly, during either the waking or the sleeping state. There is a sudden fixation of the eyes, which are often rolled up or down or to one side, or may converge or diverge. The limbs and trunk are rigid and stiff, the head turned to one side or retracted. Respiration is interfered with, and the face becomes dusky. After a minute or so the spasm may relax or become clonic, as in epileptic fit. Sometimes the spasm is entirely clonic, but is then slight, and involves chiefly the face and eyes, or hands and feet. The convulsions of rickets may be few and cease after a few days, or they may recur during several weeks or months. Not uncommonly they begin at eight or nine months, and go on through the second year of life and then cease.

Under the head of dental pathology it is unnecessary before this intelligent body to enter upon a detailed discussion of dental caries, diseases of the pulp and pericementum, but instead your essayist prefers .to substitute the history of a few interesting cases from his own experience, which are well worth considering in connection with this paper.

Case I.—Mrs. M., age forty-five, suffered for two and a half years with neuralgia and optic neuritis on right side. Had been under treatment by an oculist for two and a half years without relief; also under treatment of a dentist constantly for one and one-half years. Referred to me for extraction of two molars with gas; they had been treated and filled, fillings removed and re-treated several times. They were to all appearances not implicated, and examination revealed a large amalgam filling in right inferior wisdom-tooth, filled twenty years. Heat tests produced intense paroxysm in eyeball. Treatment, devitalization and root-filling, saving the three molars. Five years have passed, and not an.iota of neuralgia or optic neuritis has returned.

Case II.—Mrs. M., age thirty, called six weeks since, having suffered severe pain on the right side of face. Her family dentist failed to locate the origin of same, though he had devitalized and treated the inferior right first molar. The family physician had prescribed antipyrin, phenacetin, and other arterial sedatives without avail, and finally referred her to me for examination. Heat tests developed intense paroxysms when applied to the inferior right second molar. The filling was tapped, the pulp punctured and devitalized painlessly, since which time neuralgia has not recurred, the root-canal and tooth having since been filled.

Case III.—Mr. F., age sixty, consulted me a year or more ago, while suffering the most intense paroxysmal neuralgia on both sides of the head and face. Had suffered almost constantly for two and a half years, and had at the same time been under the constant treatment of a reputable dentist. Examination found most of the teeth filled with large amalgam fillings at the buccal surfaces and cervical margins, where there was some recession of the gums. Percussion developed marked tenderness in five molars, two on the right and three on the left side. Heat tests gave no responsive pain. These fillings were tapped, the mummified pulps removed and the canals treated and filled. No further neuralgia supervened for five months, when the patient returned suffering as before, with excruciating pain. Another dead pulp was removed, giving complete relief, since which time, seven months, the patient has been comfortable.

These three cases illustrate pathological types spoken of in the paper as of peripheral origin.

References.—"Intra-Cranial Tumors," Bramwell; "Practice of Medicine," Flint; "Practice of Medicine," Loomis; "Disease of the Nervous System," Gowers; "American System of Dentistry."

CONCERNING COMBINED FILLINGS.

BY W. D. MILLER, M.D., D.D.S., BERLIN.

MOST practitioners of dentistry will, I think, readily indorse the statement that of the many materials used for filling teeth there is not one that does not fall far short of fulfilling the requirements of what might be styled the perfect or ideal filling-material. It is equally indisputable that the advantages or disadvantages of the various materials manifest themselves in various degrees in different classes of cavities, as well as often in different parts of one and the same cavity.

For instance, in compound cavities gutta-percha serves its purpose excellently at the neck of the tooth, decreasing in efficiency rapidly as it is carried toward the grinding-surface; while the cements, which may occasionally serve a good purpose at the grinding-surface, generally become worthless as we approach the neck of the tooth.

These well-recognized facts not only suggest the idea of an eclectic practice, but have already given rise to the employment of various combinations of two or more materials for filling one and the same cavity. Furthermore, experiments in the laboratory, as well as experience in practice, have established the fact that for certain cases two materials thoroughly combined or mixed together, *before introducing into the cavity*, may give a much better result than either of the ingredients used alone.

We accordingly recognize two classes or categories of combined fillings,—those in which different parts of the same cavity are filled with different materials, and those in which the materials are so mixed that the filling has the same character throughout. The former might be designated as jointed fillings, the latter as mixed fillings.

In the following lines I desire to call attention to some of the methods of combining different filling-materials which have been recommended, and in part have stood the test of practical application.

The results thus far obtained have been sufficiently encouraging, I think, to merit more attention than has apparently as yet been bestowed upon them. Of the eighteen to twenty different combinations reported upon, some I shall only mention for the purpose of obtaining a general survey of the subject; others I shall discuss more at length as their importance may seem to demand.

1. *Combinations in which a Layer of One Substance is introduced between the Bottom of the Cavity and the Filling Proper, as a Protection to the Pulp.*

Recent communications upon this subject have added nothing new either in regard to materials or methods of manipulation, unless we except the experiments of Gilmer on the conductivity of different materials used in filling teeth (*Dental Review*, December, 1891). A completely reliable study of the comparative conductivity of different materials, as that of Gilmer appears to be, would often be of great service in determining what material should be used in filling teeth abnormally sensitive to changes of temperature.

2. *Joint Fillings of Non-cohesive and Cohesive Gold.*

Many dentists still indorse the practice of combining non-cohesive and cohesive foils, with a view to utilizing the particular advantages claimed for each preparation in the same cavity.

In large approximal cavities a pledget of non-cohesive gold is placed upon the cervical wall and followed up by cohesive gold; or in case of the front teeth, the cervical and lingual walls may be covered with non-cohesive gold; or, finally, all the walls of the cavity may be lined with it and only the central portion of the filling made of cohesive gold, which serves as a key to bind the whole together.

The reasons given for this practice have been frequently pointed out, and must be familiar to everyone. From my own experience and observation I can only indorse the procedure, though in my practice tin-gold has largely taken the place of non-cohesive gold in such operations.

The theoretical objection to this method, that the undercut becomes filled up with non-cohesive gold and that the cohesive gold does not have sufficient anchorage, I have not found to be an objection in practice. On the other hand, in saucer-shaped cavities where I have found it difficult to adapt cohesive gold, I have occasionally overcome the difficulty by making the bulk of the filling with non-cohesive and finishing with cohesive foil.

3. *Joint Fillings of Tin and Gold.*

Spooner is reported to have used tin in combination with gold as much as fifty to sixty years ago, and in recent times it has been used quite extensively in pretty much the manner described under 2. A very thin layer of tin at the cervical margin was thought to adapt itself somewhat better than gold alone, and also, "in consequence of the oxidation of the tin," to produce a filling perfectly water-tight at the neck of the tooth, a condition which can be claimed for but a small proportion of cohesive gold fillings in practice. The two materials unite in a short time, so that the objection to the combination of cohesive and non-cohesive gold mentioned above does not hold here.

I have no experience in this manner of using tin, though I am in almost constant use of tin-gold for the same purpose (as described under 5), and with most satisfactory results.

4. *Mixed Fillings of Tin and Gold.*

A thorough discussion of this combination would require more space for itself than I design to occupy for all the seventeen combinations to be considered in this article. The subject has, moreover, been repeatedly brought before the profession in late years, so that there is at present no particular call for an extended presentation of it, though I may return to it later.

It has been gratifying to me personally to see that this combination has won some warm friends in America, although on the whole it has met with considerable adverse criticism, chiefly from those who have tried it but little or, often, not at all, and whose opinions therefore are naturally entitled to less consideration than those of practitioners who have given the material a fair trial. Some of the remarks I have read concerning tin-gold do not quite come up to the standard set for unbiased scientific criticism. For example, Hungerford is credited with the statement (*Western Dental Journal*, May, 1891, p. 240) that non-adepts in the use of gold are the ones who favor the combination. Any one inclined to make use of the same style of argument could only reply, Then why doesn't H—— favor it? There is of course nothing to be gained by this mode of discussion. Besides, if the combination of tin and gold fulfilled only a need of the non-adept, what a blessing it would be to the profession and the community!

As a matter of fact, however, there is not a man in the dental profession who is so proficient in the use of gold that he can afford to ignore materials which may not require for their successful manipulation quite as high a degree of skill as is required by gold. Finally, it is not difficult to find cases in which it requires much more skill to make a good filling of tin-gold or of non-cohesive gold than it does to pile up mountains of cohesive foil.

The position taken by Ottolengui (DENTAL COSMOS, February, 1892) appears to me to be also contrary to the experience of the great majority of the dental profession; when he argues that there is no need of new filling-materials. Repeatedly we are confronted by cases where we are obliged to ask ourselves, not the question, Which is the perfect filling-material for this cavity? but, Which has the fewest objectionable qualities?

The old song that failure of gold at the gingival margin is due to faulty manipulation does very well, but failure at the gingival margin continues to occur and will continue to occur, even in the hands of the most skillful and conscientious dentists, to say nothing of the dentist of average skill who makes up the great bulk of the dental profession.

All honor to gold, although it is far from being a perfect filling-material ; but at the same time let us not attempt to discredit other materials, particularly when they have stood the test of over a quarter of a century, without having tested them with the same skill and patience and conscientiousness which we are called upon to cultivate in the use of gold.

Having used both gold, and tin and gold, for fifteen years, I can only say that I meet almost daily with cavities which I can fill better and with far more ease to myself and to my patient with tin-gold than with gold alone ; and as there is no reason to suppose that I am different in this respect from *everybody* else, the inference is justified that others who would give the material a fair trial might find the same. Besides, this is the testimony of a great many practitioners who have become thoroughly acquainted with the materials.

Naturally the manipulation of tin and gold is not learned in a day. The material must be inserted with care, and particularly those who have never learned the use of non-cohesive materials would probably encounter some difficulty. A badly condensed tin-gold filling will become brittle, sometimes powdery ; a properly condensed one never. I may mention in this connection also that the rolls of tin-gold should never be made with sweaty or moist fingers, or be allowed to lie in a damp place before using. They may in such case become stiff and difficult to manipulate.

5. *Joint Fillings of Tin-Gold and Gold.*

This is a combination in which tin is extensively used in connection with gold by the advocates of tin-gold as a filling-material. Large cavities of almost every character, particularly, however, compound approximal cavities, are filled one-third to two-thirds with tin-gold, and the operation completed with cohesive foil. It has a very decided advantage over amalgam used in this way, in that the gold unites perfectly with the tin-gold to form a solid filling. The operation may also be completed in one sitting, and the tin-gold has better preserving properties than amalgam.

6. *Joint Fillings of Non-cohesive Gold followed by Tin-Gold.*

A class of cavities which requires to be treated with great care is formed by approximal cavities in frail incisors and cuspids, in which the lingual wall is partly or completely destroyed. For those who use non-cohesive gold in such cases the operation may be lightened by covering the labial wall with non-cohesive gold and filling the cavity one-half to two-thirds full with it, finishing with tin-gold. In making these fillings with non-cohesive foil, I think most operators will agree with me that by far the most difficult part is the insertion of the last few pellets on the lingual wall, where we have not been able to obtain an undercut.

One or two trials will convince anyone how much more readily this part of the operation may be performed with tin-gold. Of course, a filling of this kind has a gray color upon the lingual surface ; from the front, if seen at all, it appears as a gold filling.

7. *Joint Fillings of Amalgam or Cement over Gold.*

This combination applies only to those cases where a thin layer of gold is placed against a thin wall of enamel to prevent the cement or amalgam from showing through. If the surface of the wall is first given a thin coat of varnish, the gold will adhere to it and keep in place while it is being fixed with the cement or amalgam. Where amalgam is used, Morrison (*Archives of Dentistry*, May, 1891) recommends gilded platinum, since it does not become amalgamated by the mercury.

8. *Joint Fillings of Amalgam and Gold.*

The practice of filling very large and difficult cavities one-third to two-thirds full with amalgam, and covering this with gold, has been carried out to a considerable extent, but reports as to the manner in which such fillings have stood the test of time are still wanting. Their chief advantage over all-amalgam fillings is their appearance, and the better preservation of the teeth at the grinding-surface; their chief advantage over all-gold fillings is their ease of insertion, and, probably, in difficult cases, the better preservation of the tooth at the neck.

One of its great disadvantages, which it possesses in common with many other joint fillings, lies in the fact that the two parts of the filling do not unite with each other. It is often also a serious drawback that the operation requires two sittings for its completion.

I have seldom used it myself, because I consider the combination discussed under 5 preferable for most cases, since it gives a better adaptation of the filling at the neck of the tooth; both parts of the filling unite firmly together, and the operation may be completed in one sitting. I have occasionally used the amalgam and gold to advantage in distal cavities in the molars, in cavities involving the distal and buccal surfaces of bicuspids, filling the distal portion with amalgam and the buccal with gold.

A method of making amalgam-gold fillings in one sitting was described by Clapp (DENTAL COSMOS, 1888, p. 870), and should be referred to in this connection. The principal features in Clapp's process are: (1) The preparation of the cavity with square edges in the portion to be occupied by amalgam; (2) the adjustment of a perfectly fitting matrix; (3) the thorough condensation of the amalgam, which should be mixed dry; (4) the use of Steurer's plastic gold for beginning the gold portion of the filling. The first pieces are swallowed up, so to speak, by the amalgam, "but by persevering the gold will soon assert itself and overpower the amalgam." The filling may then be completed with any cohesive gold. The greatest care is necessary in every step of the operation. The meager reports which have appeared concerning the success of the Clapp operation in practice have been very favorable, and the article by Clapp (l. c.) should be referred to by all who are not converts to the pernicious doctrine that any tooth that is worth filling at all is worth filling with gold.

9. *Copper Amalgam and Alloy Amalgam.*

In order to take advantage of the saving properties of copper amalgam at the cervical wall, and at the same time avoid the discoloration* of the tooth resulting from this material, as well as its tendency to wear away at the grinding-surface, it has been recommended to combine it with alloy amalgam.

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* According to my experience, copper amalgam well packed and kept perfectly free from moisture during the operation, very rarely discolors the tooth to any appreciable extent.

I have had no opportunity to examine the few fillings of this kind that I have made. W. H. Trueman (DENTAL COSMOS, 1889, p. 238) is reported to have stated that copper amalgam, while not discoloring the teeth when used alone, does have a tendency to do so when combined with gold or an alloy amalgam. He furthermore states that if the two amalgams are inserted at the same time, the alloy amalgam will not harden.

Whitney, on the other hand (*Ibid.*, 1889, p. 492), states that he is in the almost daily habit of covering copper amalgam with platinum and silver alloys, with the best results as far as hardening and appearance are concerned. Likewise Russel (*International Dental Journal*, 1889, p. 654) writes, "Some alloys will join very readily, as I have proved by filling one-half of a glass tube with alloy and the remainder with copper amalgam. When hard the tube was broken, and it was impossible to break them apart at the joint."

10. *Cement or Amalgam over Gutta-percha.*

Gutta-percha is one of the best materials at our command in places not exposed to the action of mastication. It therefore performs good service at the cervical wall in approximal or compound approximal cavities; cement, on the other hand, is altogether unreliable at the cervical wall, but holds *comparatively* well on the grinding-surface. The combination of the two materials consequently often gives a filling somewhat better than gutta-percha alone, and far better than cement alone.

For the last ten years I have very rarely made a filling of phosphate cement in cavities extending under the gum without protecting the neck of the tooth with gutta-percha, extending a thin layer of this material over the bottom of the cavity as a protection to the pulp where it is nearly exposed (Fig. 1). These fillings are, however, in one respect far from satisfactory. The cement not only wears away rapidly, but also disintegrates at the joint with the gutta-percha, so that fillings of this kind soon have the appearance seen in Fig. 2. The food wedges in between the teeth and accumulates at the point *c*, rendering it very difficult to keep the place clean. Notwithstanding this shirking of duty on the part of the cement, the intrinsic saving capacity of the gutta-percha protects the tooth from secondary decay.

FIG. 1.

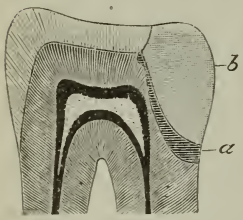


FIG. 2.

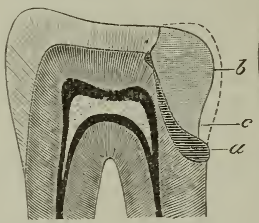
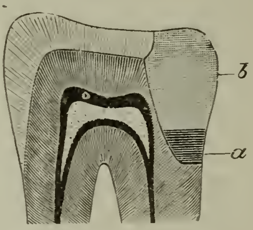


FIG. 3.



The result will be somewhat better when the gutta-percha is built up square, as in Fig. 3, though in this case it does not afford the same protection to the pulp. In like manner amalgam may be used as a capping for gutta-percha, and where the walls of the cavity are sufficiently strong, it gives a decidedly better result than cement.

In both cases a hard variety of gutta-percha should be used. I have found soft varieties to wash out, thereby rendering the result seen at *c* (Fig. 2) still more pronounced.

11. *Gutta-percha or Cement protected by a Thin Gold Plate.*

This combination was occasionally used formerly in large cavities on the grinding-surface. The plate, cut to fit the opening of the cavity as accurately as possible, has one or two short pins soldered to it at right angles to the surface, and is simply pressed upon the cement while yet soft, being retained by the pins as well as by the adhesion to the surface of the plate, which should be roughened. In case of gutta-percha fillings, the plate, of course, may be warmed before pressing into place.

12. *Amalgam retained by Cement.*

On account of the tendency of amalgam fillings (manifested, it is true, to very different degrees in different preparations) to contract or draw away from the walls after insertion, retaining points or undercuts are imperative in all cavities which do not otherwise have a retaining form.* Cases are, however, constantly occurring in which it would be of the greatest benefit, for reasons well known to every practitioner, if the necessity of making retaining points or undercuts could be avoided. For such cases it has been recommended, and to some extent practiced, to cover the bottom of the cavity with phosphate cement and to pack the amalgam immediately over it while the cement is still soft. The cement should be of a variety which possesses the greatest adhesive properties (they vary much in this respect), and should be mixed rather thin. It is well to press or prick the first portion of amalgam into the cement with a deeply serrated instrument.

Experience with this method has been limited as yet, but there is no question in my mind that it is worthy of trial. A few experiments made out of the mouth will soon convince one that the amalgam firmly adheres to the cement.

13. *Gold retained by Cement.*

In a manner similar to that just described cement may serve to retain or help to retain gold fillings in shallow cavities. The bottom of the cavity is covered with cement in a soft condition, one or more pellets or pledgets of cohesive gold pressed into it, care being taken that the upper surface of the gold does not become in any way contaminated by the cement. As soon as the latter is thoroughly hardened, the operation of building on the gold may be proceeded with. Naturally a very adhesive, quick-setting cement is desirable.

A somewhat different method of obtaining the same result has been recommended by Oltramare (communication faite au Congrès odontologique suisse, le 4 Octobre, 1890).

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* An exception may be made in favor of some copper amalgams.

He uses a gold cake, prepared out of the mouth, which he presses upon the cement already partially hardened, at the same time warming the gold by means of a heated burnisher or by blasts of warm air. The cake is easily pressed into the cement, which has been resoftened by the heat and adheres firmly, while the cement quickly sets again and permits the operation to be proceeded with almost immediately.

Oltramare prepares the gold cake by condensing a number of gold cylinders or pellets upon the surface of a serrated steel plate, holding the gold with one instrument and condensing it with another. The cake must be adapted to the cavity in size and form, and being serrated on the under side it adheres very firmly to the cement if properly adjusted. Experiments out of the mouth give very promising results.

14. *The Combination of Amalgam and Cement*

has in late years received considerable attention both in Europe and America.

The first reference to the method which I have met with in dental literature is found in a communication by Tileston to the *Dental Review* of August, 1888. In Germany Sachs has done much to introduce the operation; also Klemich (*Journal für Zahnheilkunde*, 1890, No. 11) writes that he has used the mixture for many years.

I have already described the method of mixing the materials, in the DENTAL COSMOS for January, 1891, p. 21, and have nothing essential to add to what has been said there. The cement should be of an adhesive (sticky) variety, and must be thoroughly incorporated with the amalgam, while the amalgam must be of the best quality and contain enough mercury to effect a complete amalgamation. Incorporated in a powdery condition, it may do more harm than good.

It is claimed that the combination does not contract on setting, and experience seems to confirm the claim. It appears to withstand both mechanical and chemical action much better than cement, and is a poorer conductor than amalgam; it is as easily inserted as cement, and is nearly as adhesive. It certainly deserves a trial. I use it almost altogether where I otherwise might be tempted or compelled to use cement, and have been very well pleased with the results. I do not, however, wish to be understood as unreservedly recommending the combination; experience has not yet been extended enough for that. In some cases I have found it to wear away at the grinding-surface. Its color is against it in some cases, though I have not found this an objection except for the upper front teeth. It may be varied almost at will, since it depends upon the color of the cement used and the proportion and quality of the amalgam, as well as upon the particular preparation of amalgam used.

In a case of extensive erosion of all the front teeth, where the patient would not think of having gold and cement had proved almost useless, I obtained results with cement and amalgam with which both the patient and myself were better pleased as to appearance than with cement, and which have already outlasted two cement fillings and still show but little sign of wear. I should say, however, that in this case the teeth were considerably darker than the average.

I have occasionally also found cement-amalgam very convenient for setting pivot teeth in forlorn cases, and must say that it has worked far better than cement alone. I should think it would be excellent for setting Logan crowns, but have no experience in that direction.

15. *Combination of Gutta-percha with Alloy Filings, Tin, etc.*

Repeated attempts have been made to increase the hardness and resistance of gutta-percha by incorporating various inorganic substances into it. The world-renowned Hill's stopping is one of the results of these attempts. More recently it has been sought to attain the same end by softening the surface of the gutta-percha filling with chloroform (Butler), or with eucalyptol, or by heat, and then working filings of alloy into the superficial layers (Line). Finally, the softened gutta-percha has been kneaded together with metal filings before introducing it into the cavity, so that not only the outer layers but the whole filling was permeated with the filings. Up to the present, however, no particular advantage seems to have been gained by these experiments.

In the February number of the DENTAL COSMOS, Line recommends a new method of combining tin with gutta-percha in which the filling is so made as to consist of alternate layers of gutta-percha and tin, so placed that the layers are parallel with the direction of the force in mastication. Fillings so made are observed to wear away much more slowly than gutta-percha fillings. (See Figs. 4–6, also consult original article, DENTAL COSMOS, 1892, p. 133.)

FIG. 4.

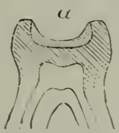


FIG. 5.

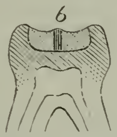
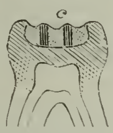


FIG. 6.



16. *Combinations of Cement with Alloy Filings or with Pulverized Porcelain.*

Parker (*Ibid.*, 1890, p. 30) recommends very highly "zinc-phosphate and alloy filings mixed and prepared for filling as ordinary phosphate." Having used it for five years, he finds it far superior to any cement. He uses an alloy of silver, tin, and a little platinum. Alloys containing much zinc or copper should not be used. The cement should be the dento-plastique of The S. S. White Company, or something like it. "It has the qualities of any cement; secondly, it always presents a metallic surface, so that it is worn down very slowly by mastication; thirdly, as to conductivity it is better than either of the strictly metallic or cement preparations" (Parker, l. c.). Howe (*Ibid.*, 1890, p. 33) likewise speaks well of the mixture.

Perry (*Ibid.*, 1890, p. 32) has occasionally used pulverized artificial teeth mixed with the phosphate, sometimes with astonishingly good results, sometimes not. I have tested the method a few times, and suggested it in the *Oesterreichisch-Ungarische Vierteljahrsschrift*, January, 1887, but was not sufficiently encouraged by the results to continue the experiments.

17. *Combination of Glass or Porcelain with Amalgam or Gold.*

Cases are frequently to be met with in which caries, beginning on the approximal surface of the upper incisors or cuspids, has destroyed a portion of the labial wall. Fillings of gold are naturally more or less conspicuous; cement is not much better, besides being very impermanent; porcelain or glass fillings cannot be inserted for want of space. For these cases Dall, of Glasgow, first recommended, I believe, to fill the lingual or approximal portion of such cavities with gold or amalgam, then to properly shape the labial or visible portion and insert a porcelain filling.

A case in which I was able to employ this combination to advantage was that of a superior first bicuspid, of which only a portion of the lingual cusp was still standing. The patient decidedly objected to a crown as being artificial, and demanded something which would not be conspicuous by its color. I built up the crown with cement, which only partially satisfied her demands, and in a few months was of course very much worn down. I then restored the crown with amalgam, and when it had set, on the following day, prepared in that part of the filling which was visible from the front a box-shaped cavity with rounded corners, took an impression with No. 30 platinum gold, melted a glass filling, and set it in with phosphate cement. No one, except perhaps a dentist, conversing with the lady, would suspect that the tooth was not perfectly sound. The operation was performed only five months ago, so that not much can as yet be said as to its durability.

Besides the combinations already referred to, various others have been proposed or recommended, such as inlays of vulcanized rubber, combinations of Robinson's fibrous foil with gold, using mercury to establish the union between the two (McLeod, DENTAL COSMOS, 1890, p. 209). Furthermore, the use of two metals in combination for root-fillings, in order to bring about an antiseptic action through the electric currents thus established, or, what seems to me to be of still more doubtful utility, the use of a wire of combination metal of tin, silver, and gold in the treatment of pulpless teeth to obtain an *electric stimulus*.

METHODS OF FILLING TEETH.*

BY RODRIGUES OTTOLENGUI, M.D.S., NEW YORK, N. Y.

(Continued from page 490.)

SPECIAL PRINCIPLES INVOLVED IN THE PREPARATION OF CAVITIES AND THE INSERTION OF FILLINGS.

I NOW come to the consideration of cavities in the incisive edges of incisors and cuspids, and the masticating surfaces of bicuspids and molars.

Strictly speaking, a cavity in the incisive edge of an incisor is a rarity, less so in the inferior than in the superior teeth. In making this statement I do not include abraded teeth, but refer to such only as have suffered no other depredation at this part. I have seen a few

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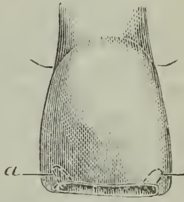
cases where a distinct cavity, truly carious in character, has presented, seen along the incisive edge only, and not involving either labial or palatal surface. They are found in the form of tiny dark spots, into which the fine point of an explorer readily passes, sometimes to a considerable distance. Such a cavity probably has its inception in an imperfection in the enamel, a tiny pit offering a suitable starting-place for caries. To prepare these, it is only necessary to remove the decay thoroughly, care being observed not to split off the enamel along either surface, thereby producing a fracture which would necessitate an awkward and unsightly filling. To fill, use gold, in tiny pellets, or better still depend upon crystal. When completed it should appear as a small polished gold dot.

I have seen caries along the full length of the edge of a central incisor, appearing as a black line and extending to a considerable depth. When all the decay is removed from such a cavity, no special alteration of shape is needed to achieve retention. The depth, in connection with the narrowness of the fissure, and the roughness of the walls, will prove sufficient. To fill with gold, a convenient method is to select a pellet about the length of the groove, and just thick enough so that it must be slightly compressed as it passes the orifice ; this is an exception which marks the difference between general and special principles. Suppose, however, that such a cavity should present, the caries having proceeded only to a slight depth. Then the groove would not be deep enough to retain the filling. Should it be deepened ? To do so would be unwise. While we must accept the condition as it is found in the first instance, we must not reproduce it in the second, even though it be an effectual retentive shape. To deepen the cavity would be to render the labial and palatal walls weaker, and make more probable the subsequent splitting off of the one or the other. Such an accident would be especially likely to occur in the mouth of a woman, for despite constant precautions, women will bite off threads with their teeth. The cavity is shown in Fig. 137. It is prepared with a tiny rose bur, and retention depends upon a slight dip into the dentine at each end of the cavity, *a* and *b*. It is evident that this makes the filling after insertion just a trifle longer within, than at the orifice, which is all sufficient. To fill with gold we must proceed differently to the method advocated in the deep groove, where I said we might start with a long pellet. Here it is better to begin at one end, and build across to the opposite pit with small pellets. As soon as the floor is thus covered, and the retaining-points connected, the filling must be completed with heavy gold cut into very narrow strips, about as long as the cavity. The finest-pointed plugger, and the hand-mallet, will give us a filling which will keep its density of surface forever. It is the filling of such cavities as these which show whether the dentist is an artist or merely a mechanic. They are so accessible, and apparently so easy, that I have seen many men at clinics select them for demonstrating rapid work. Yet rapid work here means the use of too large pieces of gold, and imperfect condensation of the gold, with the result that after moderate usage the gold becomes rough.

FIG. 137.



The same system practiced where the entire edge is covered brings the filling back with a ragged edge turned up, as is seen on the ferrule of a cane or umbrella.

Sometimes we find an incisor presenting with a brownish spot which may occur so as to involve the incisive edge. Immediately upon eruption, though the tooth-substance is imperfectly calcified, yet it is protected to some extent by the fact that there is a superficial crust which is more dense than what underlies it. After a few years this crust may break down, and filling become necessary. It is wiser to remove all of this imperfection, as the dentine will be found to be chalky. Where only the labial plate of enamel is involved, the presence of the palatal renders the cavity more simple. I will therefore choose for illustration such a cavity, the preparation of which has required the removal of a part of both surfaces. Fig. 138 shows the cavity in a central incisor prepared for filling. After removing all of the defective dentine, the first step toward retention is to make a rather shallow groove along the whole extent, nearly the full width of the dentine and not encroaching upon the enamel. This direction analyzed is found to indicate that this groove is narrower as it approaches the incisive edge. It is at once seen that already the shape is retentive, since the filling would be wedged in laterally. It would be difficult, however, if not impossible, to successfully fill the cavity so formed, because there is no starting-place. Moreover, should any accident in the future fracture either of the frail corners, the entire filling would be lost, and a difficult operation be entailed for the restoration of the tooth. I have in mind a case where I filled both superior central incisors, having cavities of this nature. Some years later the lady called with the distal corner of one, lost by fracture, and I was able to build on a contour without removing the original filling. For a firm anchorage, therefore, form a dovetail by extensions in the directions indicated by *a*, *a*, in either of which the filling may be readily started, the arrangement being of such form as will retain the first pellet.

FIG. 138.

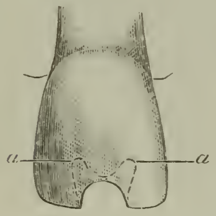


FIG. 139.

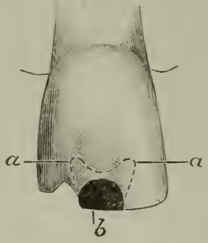
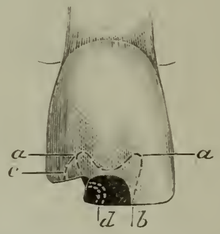


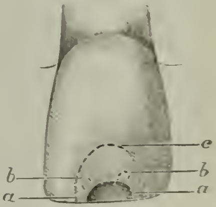
FIG. 140.



It is opportune at this point to indicate how to proceed should the accident occur to which I have referred, the tooth coming back with one corner missing. It will usually appear as shown in Fig. 139, where we see the retentive shaping as before indicated by the dotted line *a*, *a*, the filling itself now observed at *b*. The distal corner is absent. A study of this illustration will bring us to the conclusion that the loss of the corner has not impaired the integrity of the filling. Of course had the fracture occurred higher up, let us say on a line with *a*, the gold would need removal. But the most probable presentment is as indicated. How shall we proceed? Very little is to be done to the tooth itself, the main reliance being upon dovetailing into the gold filling. Fig. 140 gives an idea of the new cavity ready for filling. The sharp angle left by the fracture has been removed so that the completed filling will be more sightly. A small rose bur has been passed to the upper end of the extension at *a*, and from this point a groove formed as indicated by the dotted line *c*. A deep undercut has been made into the gold filling, as shown by the dotted line *d*. This undercut is made with a bur, and the gold into which the undercutting is carried may be advantageously left rough. It is even possible by thorough drying to produce an approximation of cohesion between the new and the old gold, but this is not essential, as a sufficiently strong mechanical union occurs by careful filling. The first bit of gold may be placed in the extension at *a*, and crystal will be found to serve admirably to begin with.

I will relate an incident which will better convey the importance of properly filling the next cavity which I am about to describe, than any mere words of caution. A child of fourteen whom I saw occasionally, but who was not in my care, fell and splintered off a portion of the cutting-edge and labial face of the enamel of a central incisor, making a cavity which could have been prepared proportionately as shown in Fig. 141. She was taken to her family dentist, and when I next saw the girl a gold filling had been inserted of about the size indicated. I asked permission to look at the tooth, but after examination made no comment, satisfied that any adverse criticism would have been counted professional jealousy. About two years later, having seen little of the girl in the interim, I met her, and my glance at once wandered toward that filling, which I noticed had grown to about the size indicated by the dotted line *c* in Fig. 141. Questioning elicited the information that the cavity had been refilled three times, each operation enlarging the area of gold. The last filling, though a poor one, has remained in place, but the young lady is disfigured for life, or as long as she retains the tooth.

FIG. 141.



When a patient presents with a fracture of this nature, the first care of the dentist should be to examine carefully in order to determine whether the dentine has been denuded at any place. If not, it often occurs that the fracture may be stoned down and polished, even where there may be a considerable concavity, making a much more presentable appearance than after the insertion of gold.

The concavity may be made less conspicuous by the judicious beveling of the labial surface near the incisive edge. Even where the dentine has been uncovered, I have sometimes polished it and so left it, whilst in other cases where this seemed inadvisable I have first ground down the tooth, as directed, as far as could be done with safety, and then prepared and filled that part where the dentine had become exposed. Thus it is seen that the aim should always be, first, to avoid filling at all, and second, to make the cavity as limited as possible.

Where the fracture is so deep that a filling is peremptorily demanded, only the finest of burs should be used in forming the cavity. I should recommend that drills be avoided, as tending to shiver and split the enamel. A new rose bur is safest and best. The first step will be to use the corundum, polishing down what need not be included in the cavity proper, and sharpening and perfecting the border lines decided upon. Next, with the rose bur, cut a tiny groove around the semicircle, making it deeper laterally at *a*, *a* in Fig. 141, and deepest at the mesial and distal corners *b*, *b*. This cavity should be first floored over with the tiniest of pellets, and then completed with heavy foil not heavier than No. 30, cut into quite small pieces. Small points are needed, and light taps of a hand-mallet. Such a place as this is a good one in which to avoid a power-mallet of any kind.

In order to make more clear the fact that this plan avoids the danger of disaster such as occurred in the case described previously, I must point out the difference in the arrangement.

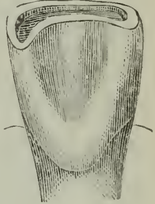
When I examined the first filling which had been placed in the child's tooth, had I criticised it I should have called attention to the following facts, as indicative of future failure : The surface of the gold was pitted, showing that it was not densely packed. Yet other work by the same dentist proved that he knew how to pack gold. The reason of his failure to do so here was seen as soon as the borders of the cavity were examined closely. All around the semicircle the gold could be seen showing through the thin, transparent enamel, whilst the enamel itself showed minute cracks, such as would appear in a bit of china or glass first heated and then dropped into cold water. The probability is, that whilst packing his gold the dentist noted that his borders were breaking down, and deciding that it was the fault of the tooth-structure, he felt obliged to use either a lighter mallet-stroke, or else to depend entirely upon hand-pressure. The truth is, the whole fault lay in the preparation of the cavity, and in showing this I will indicate to the student a cause which is productive of a large proportion of failures along the margins of fillings. What this dentist had neglected to observe, if expressed as an axiom, would read, "*As far as possible, avoid placing gold in contact with the dentinal surface of enamel.*" In the preparation of all cavities, it should be the constant care that *in undercutting, some dentine be left in contact with the enamel.* In the case under consideration the dentist had made a deep groove all around his semicircle, and had entirely removed the dentine from beneath the enamel. Thus as soon as he packed gold into the grooves, especially where he attempted to use the mallet, his gold acted as a wedge to lift the enamel, and, being extremely brittle, it will never endure this. Yet I have myself recommended a groove. But observe that I say "only the finest of burs should be used," and as to the groove itself, my description is, "With a rose bur cut a tiny groove around the semicircle, making it deeper laterally at *a*, *a* in Fig. 141, and deepest at the mesial and distal corners *b*, *b*.". By "laterally" in the above sentence I mean simply at the sides of the cavity, and do not use the word to describe the formation of the groove except as to depth. I would not make this groove horizontally, but rather obliquely, dipping inward toward the dentine. At the corners *b*, *b* this dip should be more pronounced, as here we are in safer territory, can reach stronger dentine, and must depend most for the retention of the filling.

In one more important essential had the dentist erred. He contoured the edge of his filling, restoring the incisive edge to its original shape, or made it more square by use of his corundum. When it is remembered that almost every morsel of food passed into the oral cavity is first cut off with the incisors, it is plain that much strain must come upon this weak spot. Where the filling is left square at the incisive edge, it becomes a lever which tends to dislodge the gold. Therefore in finishing such a filling it is always wise to round off the edge thoroughly, even though it be necessary to dress down the full width of the tooth along the labial edge.

Next we come to abrasions. When seen in the earlier stages the edges of the incisors present, worn off on an oblique plane, the dentine being exposed and cupped out so that it appears as a marked depression or concavity. At first this concavity is puzzling. We appreciate the fact that the opposite or occluding tooth is the main factor in the depredation, yet when brought together the offender by no means fits into the grooved dentine. Some have, from this argument, claimed that all these concavities in the masticating surfaces of teeth are results of *erosions*. This is most probably an error. They are *abrasions*, and are accounted for by the fact that the food which is chewed plays a part in the destruction. As long as the end of the tooth is protected by enamel, the abrasion goes on horizontally; the occluding tooth accurately fits into the abraded surface. *No concavity in the enamel appears. This in itself is sufficient to eliminate the idea of erosion, for erosions invariably form concavities in the enamel before the dentine is exposed, whilst after it is exposed there is no more marked concavity in the dentine than in the enamel, the whole presenting a single continuous cupping.* The contrary is true with abrasion. As soon as the dentine is reached the concavity begins to appear, becoming greater and greater as the dentine is wasted away. *The cause is, that the friction from the food causes a more rapid wearing away of the dentine than of the more resistant enamel.*

I have taken this up at some length, because, while I am not dealing in this work with etiology, it becomes essential to be able to decide between an abraded and an eroded surface, because they require different modes of treatment. An abrasion may safely be filled with gold, while to so treat an erosion is often futile. These groovings in the incisive edges of incisors then are abrasions, and should be filled with gold, or gold and platinum, as early as possible, when filling is demanded. Fig. 142 shows a typical case in a central incisor. The palatal aspect of the tooth is shown, because from this view we may best see the depredation. It is observable that the abrasion is greater at the distal corner. This is frequently the case, due probably to the fact that this corner occludes with two teeth, thus striking against two sharp corners instead of one. Or it may be because, as we are prone to pass the food into one side of the mouth or the other, the distal corner will be given more work than the mesial.

FIG. 142.



Here we find a tooth needing filling, but having no cavity. It will be requisite for the dentist to be able to thoroughly explain the necessities of the case to his patient, and he should also command his full confidence. The first point to be decided is whether or not the incisors really need to be filled. The only object is to save the teeth from further abrasion, as decay is neither present nor likely to occur. Where the incisors alone are involved, they should be filled. In such a mouth it will be found that in the forward occlusion, as when biting bread, the posterior teeth do not touch. This is a normal condition, and if present, notwithstanding the fact that the incisors are abraded, it will indicate that the anterior teeth have not yet been materially shortened, so that to avoid further loss they themselves must be filled. In a case which has advanced further, when the forward bite is essayed, the posterior teeth will usually be found in contact, though this is not an invariable rule. This will show that the anterior teeth have been considerably shortened. Under these circumstances it may not be necessary to interfere in the incisive region at all, for as the teeth come squarely together regardless of which bite is attempted, it follows that if the posterior teeth be filled in their masticating surfaces further abrasion may be retarded all around the arch. If this be true, it will be unwise to disfigure the front of the mouth by placing gold in the incisive edges of the incisors.

The preparation of such a cavity as must be made in a tooth abraded as shown in Fig. 143 is as follows. With a corundum stone lightly pass over the labial edge to make it smooth ; then dress down the palatal edge rather freely, designing to restore it with a sufficiency of gold to make a good resistant surface to the action of the opposing tooth. With a rose bur cut a groove, being careful not to reach the enamel in any part. With bur or drill form an extension or pit at each end of the groove as shown by the dotted lines at *a*, *a*. In filling, start with pellets of gold foil, and complete with gold and platinum, being extremely careful to thoroughly unite and condense each piece.

FIG. 143.

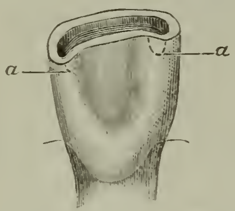


FIG. 144.

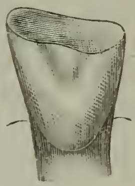
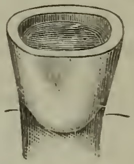


FIG. 145.



When abrasion has been allowed to progress for years, we have that condition which has probably originated the legend among certain folk that their grandfathers had "double teeth all around." A central incisor might present as shown in Fig. 144, the occluding tooth now fitting it like a die, there being little if any concavity. When filling a set of teeth thus destroyed, I deem it unwise to essay the opening of the bite to any extensive degree. The patient is usually old, and will be happier if not asked to adopt a new habit. In the tooth figured, it is essential to completely tip the edge with gold. I should begin by shortening the tooth equal to the amount of gold which I had decided should extend over the edge. This would at the same time bring the tooth into a more symmetrical form, as shown in Fig. 145. The preparation of the cavity is simple, consisting of the formation of a cup, and a groove around to render the shape retentive. There is usually no difficulty from the pulp, which we commonly find either devitalized or calcified. For filling, gold and platinum is preferable to gold, because more resistant.

A somewhat similar form of tooth might occur as a result of fracture, but in that case we should have to consider the presence of the pulp, which now would not be found calcified. We might make some slight undercutting, as shown in Fig. 85, where a failure by another dentist was recorded, but it would be wiser to also rely upon screws, as indicated in Fig. 96, where a lateral incisor was built down.

Possibly the most trying cases along the incisive edges are those which appear as seen in Fig. 146, where we have incisors in which the incisive edge is partly absent as a result of fracture, whilst what is left is thin, friable, and malformed. Such teeth have been referred to syphilitic taint, to rickets, and to measles. Whatever the etiology of the condition may be ultimately proven to be, in the meanwhile we have to contend with it as it is. Where neither fracture nor caries has supervened, however unsightly the affected teeth may appear, we *may* decide upon non-interference. When, however, one or more of the teeth are found as in Fig. 146, we are compelled to do something. To attempt a gold filling in the break only would be folly, for the adjacent parts do not offer a reasonable hope of maintaining their integrity. Neither could we place the gold so that it would have a fairly commendable appearance. Most often the serious disfigurement is chiefly confined to the four incisors, extending higher on the centrals than on the laterals. Rarely the incisive ends may be ground off similarly to the method indicated in Figs. 121 and 122. Suppose that we decide against shortening the teeth, and determine upon filling, the procedure would be as follows: Grind off all the ragged ends of the four incisors, and then prepare each in the form of a groove,

FIG. 146.

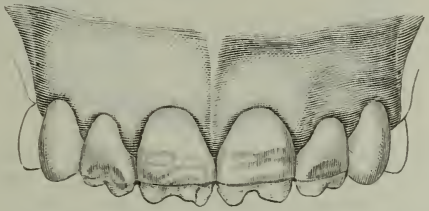
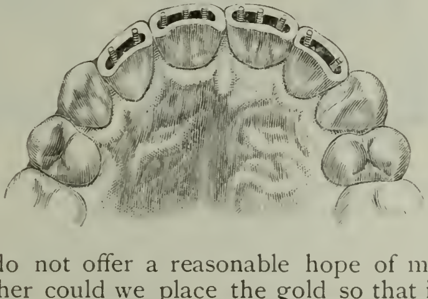
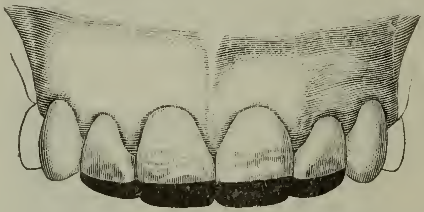


FIG. 147.



in which place screws, three in each central and two in each lateral incisor, as shown in Fig. 147. The fillings should be made with gold and platinum, and the contour restored sufficiently to render the length of the teeth adequate, though we need not always build to original lines. The result is shown in Fig. 148, where we note that the border-line on all four teeth has been made uniform. Slight imperfections still appear in the centrals. These are merely pits which are shallow, and it would be unwise to remove enough of the teeth to eradicate them when they are so high. Some would argue in favor of tipping these teeth with porcelain, while others might advocate cutting off the crowns and replacing them with artificial substitutes. I am not discussing here the relative values of such methods, but must be understood simply as describing how to fill these teeth, when such procedure is deemed best by the operator.

FIG. 148.



The incisive edge of the cuspid is different from that of incisors, and may be considered unique, since it also varies materially from the cusp of the bicuspids, in being more readily cleansed of food because of its being a single instead of a double cusp. Nevertheless, genuine caries will occur with more frequency along the edge of this tooth than in the incisors or the ends of the bicuspid cusps. This will be seen with greater frequency in mouths which show such incisors as I have just been discussing, and the probability is that whilst the cuspids escape the extensive malformation, nevertheless there often occur imperfections in the enamel which, being deep pits, readily serve as an initial point for true caries. In this class of teeth we may find such cavities as is shown in Fig. 149, where we see that the decay has destroyed the edge to one side of the median line of the tooth. This will happen oftener than the cavity shown in Fig. 150, where the actual tip or point is absent. The preparation of either of these cavities is simple, and is indicated by the dotted lines in the illustrations. It consists of removal of all decay, which will usually leave a cup shape favorable for our purpose anyway, but which may be strengthened by

FIG. 149.

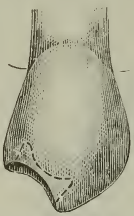


FIG. 150.

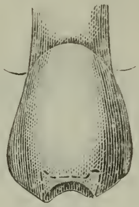
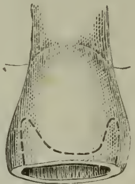


FIG. 151.



slight extensions in opposite directions, rendering the filling, when placed, larger within than at the orifice.

In Fig. 151 we see a cavity which would result were the last one neglected. Its preparation and filling is similar to that of the smaller cavity, except that we must get stronger anchorage, since a more extensive contour is now needed, and, moreover, having approached the pulp, great care is requisite lest that organ be injured. The main idea after the removal of all decay, is to avoid taking away any of the dentine covering the end of the pulp, which we know is near. Indeed, it is a general fact to be observed in the preparation of all cavities by the methods which I advocate, that *a well-marked hill of dentine appears within the cavity and over the pulp*, which principle has been explained diagrammatically in Figs. 3, 4, 5, and 6. Avoiding, then, the central point of the cuspid cavity, deep extensions are to be made at each side, slanting away from the pulp and lying parallel to the mesial and distal sides of the tooth. Where the cuspid is quite thick through, an advantage will be gained by forming a deep groove connecting these lateral extensions along the palatal part of the cavity. A groove of some depth must be made in any event, for it must be remembered that in mastication the forces exerted will operate to throw the filling outward toward the labial side. This undercut along the palatal side therefore will be a valuable restraint, provided that it is not made at the expense of weakening the wall, a circumstance which should prevent undercutting in any position. All of these cavities in cuspids I prefer to fill with gold. I like its appearance better than the gold and platinum, and in the cuspid, where we have a point and two slanting planes, the force of mastication is much less injurious. A good gold filling in the edge of a cuspid will do faithful service in comparison with gold and platinum in the incisors of the same mouth.

Where the end of a cuspid has been worn off square by abrasion, the one point to be specially noted here is that the tooth is not to be restored to its original shape by reproducing the point. Occasionally it may be necessary to produce a general effect by forming slightly slanting planes rather than to make a perfectly square end, but ordinarily it will be best to simply fill the concavity flush with the highest point of enamel remaining, extending the material over the enamel as a protection. Here, of course, as with the abraded incisors, we must use gold and platinum, for the teeth are now occluding squarely end to end most of the time, if not always.

(To be continued.)

CORRESPONDENCE.

"JUMPING THE BITE."

TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—On page 447 of the June COSMOS for this year appears the following from the pen of Dr. Norman W. Kingsley, of New York city:

> "I can only offer a theory: that it was the result of accidental causes occurring at the time of the eruption of the second set, beginning with some slight deviation of occlusion which may have affected the articulation at the condyles,

and that in turn aggravating the malocclusion of the teeth. I am quite aware that such a theory will be scouted by Dr. Talbot (*vide* his paper before the New York State Dental Society, 1892), yet in that same paper he says, 'I have never been able to "jump the bite," although I have tried in a number of cases. I do not believe anyone else has been able to accomplish it, nor do I believe that such a thing is possible.'

"This is the most extraordinary statement I have ever read from that fertile author, and it argues either that I attempt to impose falsehoods upon my colleagues, or that I *can* accomplish that which Dr. Talbot cannot, and which he believes *impossible* because *he* cannot. It has been done repeatedly by me for more than twenty years, and the great change in facial appearance in the case (Figs. 25 and 32) was due almost entirely to 'jumping the bite.' A moment's reflection will recall the knowledge to any dentist that the lower jaw can be moved forward or backward on the same plane more than the diameter of a tooth, and this difficulty confronts everyone in making full sets of artificial teeth."

It will be observed that I make the statement that "I have never been able to jump the bite (by the forward or backward movement of the condyles in the glenoid cavity the distance of the width of a bicuspid and a new socket formed). I do not believe anyone else has been able to accomplish it, nor do I believe that such a thing is possible." It will also be observed that Dr. Kingsley says, "It has been done repeatedly by me for more than twenty years." Now, the question arises, Can it be accomplished or not? It is important from a scientific as well as a practical standpoint. Let us have the facts. In order that this point may be settled, I hereby offer one hundred dollars as a forfeit to Dr. Kingsley or any other dentist who will successfully accomplish this operation. A committee of three shall be appointed in the city or town where the operation is to be performed, consisting of two dentists and one physician of noted ability and standing; one to be appointed by the operator, one by me, and the two to appoint the third, who shall examine the patient before the operation and watch its progress until finished. When completed, a full report of the case, signed by the committee of three, with illustration by models (taken and arranged by the committee), shall be sent to the DENTAL COSMOS for publication.

EUGENE S. TALBOT.

"ANONYMOUS CRITICISM."

TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—In the May number of the DENTAL COSMOS you notice a letter of mine which had appeared in the *British Association Journal*, but you have unfortunately mixed it up with the question of anonymous criticism. Now, whatever may be the practice in the United States, here the majority of communications on scientific subjects to scientific journals (and even the daily press) are signed by the initials of the writer, who at the same time gives the editor his complete name and address, and I have yet to learn that anyone here dreams of imputing cowardice to the practice.

A new fact recorded by "X," or an erroneous observation nailed to the counter by "Y," is quite as valuable from a scientific point of view as if their notes had been signed by a F.R.S. of the greatest repute. With "Cis-Atlantic's" letter I have nothing to do; it seemed to be a labored joke in very bad taste.

The reason for my writing at all was to learn whether any of the readers of the *Association Journal* could corroborate the statement referring to Professor Owen from any of his works, as to me it seemed incredible. Turning now to Dr. Peirce's note, I was much surprised, and not a little sorry, to find it confined to the remarks on the horse, as if Dr. Peirce will only read my letter to the journal again he will see that I agreed with what he said, only I considered his term, "modern thoroughbred," not only too restrictive, but also as implying that in this special variety of the species the dentition differed from that in the older breeds and in the wild animal, which I did not suppose he intended to do, despite the wording. Thus, if I say that in the most improved breeds of cattle the dentition is complete at the age of two and three-quarter years, I imply and mean to imply that such is not the case in the older breeds and the wild animal.

I was going to say that the long quotation from Professor Flower's work was needless, seeing we both agree as to its accuracy; but in doing so I would have been mistaken, as it shows most clearly that I am more in accord with Professor Flower than he is, as in the passage given in italics we look in vain for the restriction "thoroughbred." Had Dr. Peirce not introduced that restriction, we would have had no difference on that question.

I have as yet received no corroboration of the reference to Professor Owen, and conclude this note by asking any of your readers, who can do so, to state in the DENTAL COSMOS the work, etc., in which it may be found.

Yours respectfully, ANDREW WILSON,
Lecturer on Dental Anatomy (*Human and Comparative*), *Edinburgh.*

DENTAL ACT IN THE CAPE COLONY.

TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—The new medical and pharmacy act, passed in 1891, was proclaimed on January 1, 1892. It provides for the registration and admission of medical practitioners, dentists, chemists, etc. All dentists in actual practice and duly licensed on June 1, 1891, are entitled to registration, but after that date no person can obtain registration unless he is the holder of a diploma or license recognized by the Council. The recognized licenses are the same as those of the General Medical Council, England; the D.M.D. Harvard, and D.D.S. Michigan, being the only American degrees acknowledged. The act is much more stringent than the English act of 1878, as it provides a penalty for *practicing* dentistry whether the name dentist be used or not. "Covering" is also prevented by another clause. One dentist (Mr. F. Strickland, L.D.S. England) has a seat on the Medical Council, and has a voice and vote on all matters relating to dentistry. He is appointed by the governor for three years.

J. G. CUNNINGHAM.

PAARL, CAPE COLONY, April 5, 1892.

PROCEEDINGS OF DENTAL SOCIETIES.

DENTAL SOCIETY OF THE STATE OF NEW YORK.

THE annual meeting of the Dental Society of the State of New York was held at Albany, May 11 and 12, 1892.

FIRST SESSION.

After listening to the president's address and the transaction of the usual routine business, the following report of the Committee on Practice for 1892 was read by Dr. Ottolengui, chairman.

MR. PRESIDENT AND GENTLEMEN: The correspondent has handed to me a number of letters received from eminent gentlemen in reply to a circular letter containing a set of queries sent to them for categorical answers. The circular commences, "In the following cases the tooth under consideration in each is a first superior molar. This tooth is chosen because it offers a palatal root, the canal of which is as accessible as the canals of single-rooted teeth, whilst the buccal roots present problems of grave importance."

Then follows a brief description of five conditions in which the superior molar may reach us needing root-canal treatment, and after each condition two or three queries are propounded.

The first is stated thus: "Condition 1, pulp devitalized by operator, and removed entire from canals." This is an unusual but still a possible condition. Note that this condition has been carefully worded so that it involves those cases where arsenic has been used, and also those others where an anesthetic of some kind has been depended upon. The main point is that the pulps have been devitalized by the dentist himself and removed entire from all roots. The first query is "Would you fill the roots at the same sitting?"

Drs. Eubank, How, Baldwin, Houghton, Clifton, Davis, Straw, Meeker, Gilmer, Cigrand, Fillebrown, Noble, and Black say yes to this, of course with the proviso that they can be satisfied that the canals are properly cleansed. Drs. Thompson and H. A. Smith say no to this. Drs. Cushing and Ottofy prefer to wait two or three days, but occasionally fill at the same sitting, while one makes it dependent upon whether there be time to do so properly, which practically counts him among those who favor the immediate root-filling, as no operation whatever in dentistry should be essayed when there is not time to do it thoroughly. Dr. B. C. Nash, however, reaches the true solution when he says, "Yes, if there be no hemorrhage, or if I am able to arrest it." This is the main fact to be considered under this condition. A recently devitalized pulp usually presents with the dead or dying tissue still connected with the living which is beyond. If removed, the vessels are torn and profuse hemorrhage often follows. If this can be arrested, as Dr. Nash says, immediate filling should be successful. In fact, to leave the root unfilled might be a danger. From the above we see that out of twenty who have directly replied to the query, only three oppose immediate root-filling.

The second query is, with same conditions, "Would you use reamers?" Drs. Conrad, Straw, Clifton, and Eubank say that they would. Dr. Nash uses the reamer only in the palatal canal, whilst Drs. Davis, Fillebrown, and Houghton use them if necessary. All the other gentlemen emphatically say no.

The third query is, under same circumstances, "With what would you fill the roots?"

Drs. Davis, Straw, Gilmer, and Black use gutta-percha, Drs. Clifton, Conrad, H. A. Smith, and Cushing recommending the gutta-percha cone in combination with chloro-percha, whilst Dr. Baldwin depends upon chloro-percha alone; making in all, nine who use gutta-percha, besides Dr. Thompson, who advocates either chloro-percha, or oxychloride and iodoform. Drs. Houghton, Nash, Darby, and Noble like oxychloride. Dr. Fillebrown says he uses gold at the apex and follows with gutta-percha. Dr. Ottofy uses a cone of oxyphosphate, presumably in a semi-plastic condition. Dr. W. Storer How uses tin foil. Dr. Cigrand writes, "I saturate the canals with zinc chloride, then dry canals. Next bathe with peroxide of hydrogen. Place small quantity of iodoform at the apex and fill with gutta-percha." Dr. Meeker gives us a choice of materials, as follows: "oxychloride, celluloid, copper thread, white shellac, and gutta-percha." Dr. Eubank says, "Palatal root with Robinson's fibrous tin, buccal with lead or gutta-percha." Thus counting all who ever use the material, we have fourteen out of twenty-one who use gutta-percha, a material which I think is thoroughly reliable.

The second condition is described thus: "Pulp devitalized by operator, removed entire from palatal canal, but buccal canals very small, admitting a broach only at opening." The first query under this is, "What do you do with palatal canal?"

To most of the correspondents this query has seemed to be similar to the last condition, and the answer of nearly all is to proceed as they recommend in the first instance. The point involved is, in view of the fact that the buccal roots are now constricted, shall the palatal canal be filled at once, or at the same time when the filling of the others is decided upon? Two correspondents have grasped this, and reply. As to the first condition, Dr. G. V. Black said, "Yes, if satisfied that canals were clean." That is, he advocates immediate root-filling there. In the present case, however, he says, speaking of all the canals jointly, "Lay in 1-2-3 mixture and seal tight with gutta-percha for one week." That is, he treats all the roots similarly. Dr. Ottofy is more explicit. The next query is, "What do you do with the buccal canals?" Replying to both of these queries, he says, "Never fill one canal at one sitting and others in the same tooth at another. Cut away the walls of the cavity sufficiently to be able to reach the supposed location of all canals. Apply glycerin and tannin for ten days. If it is then impossible to properly cleanse the buccal canals, introduce eucalyptol, which will enter the canals by capillary attraction and will 'grease' them. Then a fine broach may be passed up. Cleanse and fill as before.". In order to give the replies to this most important subject with a chance for intelligent appreciation of the same, I must state here that the third query is, "What proportion of teeth so filled have shown abscess afterward?" The point in view here is the treatment of teeth in which we find it difficult or impossible to enter the buccal canals, and as a test for such treatment I ask whether or not abscess has supervened. Dr. Black finds abscesses rare after his method, and Dr. Ottofy says one per cent. of those still under his care. Dr. Gilmer dresses these teeth with glycerin, tannin, and creasote for ten days, then uses a reamer merely to discover if the constriction is confined to the oral end of the canal. If there is no increase of canal beyond, he cleanses as far as possible and makes a fine point of either copper or gold, which he introduces with the aid of cajuput or eucalyptus oil, filling the canals with chloro-percha pumped in with the metal point, finally leaving this metal point in the canal. Where the canals are too small for this treatment and cannot be entered properly, he fills the pulp-chamber with oxychloride of zinc on account of its antiseptic qualities. I would stop here to make the criticism that it has not been absolutely proven that oxychloride of zinc has antiseptic qualities. Such property has been attributed to it quite often, possibly because of the presence as an ingredient of the chloride of zinc. But whatever chloride of zinc may effect alone, it has not yet been definitely shown that it is still active in this compound. The doctor does not remember any abscesses after treatment of this nature, but says he has been less fortunate with the same method in the anterior roots of inferior molars, a somewhat analogous situation.

Dr. Cigrand enlarges the buccal canals, disinfects, and fills with chloro-percha and iodoform. Says about two per cent. of abscesses. Dr. Meeker attempts to pump in oil of patchouly and hydronaphthol, and does not know how many abscesses occur. Dr. Geo. Eubank uses Gates-Glidden hand-drills in the buccal roots, enlarging as far as possible, and fills immediately with tin, lead, or gutta-percha. Has had but one abscess last four years, and this was a syphilitic patient who died in less than two months after the tooth was extracted. The palatal root was absorbed in that case. Dr. Thompson says, "Open, treat, and fill." Very few abscesses. Dr. Cushing treats with antiseptics, and where a broach cannot be used does not anticipate any danger from leaving the roots unfilled. Where a broach, but not a cone of gutta-percha can be passed in, he uses the chloro-percha and gold wire similar to Dr. Gilmer's method. He has no record of recurrent abscesses, but thinks the proportion small. Dr. Houghton enlarges as far as he can, renders aseptic, and fills with oxychloride. Very few abscesses. Dr. Nash does the same, and has had but one abscess in a year. Dr. Darby reams out the buccal canals with watchmaker's broach, and has a very small proportion of abscesses. Dr. Davis reams out if the openings permit, otherwise lets them go. Dr. Fillebrown reams out as far as possible, tries a probationary filling, and later fills permanently. Very small proportion of abscesses. Dr. Straw reams out as far as possible, and fills immediately. Says he has never had an abscess where he devitalized the pulp and removed it, using crystals of muriate of cocaine for thirty minutes, and filling at same sitting. Dr. Clifton uses Gates-Glidden drills, and fills with chloro-percha at same sitting. Does not know about abscesses. Dr. Conrad is dogmatic. As to buccal roots, he simply "fills them." As to abscesses, he has had none. Says "abscess after treatment, and treatment, is always due to some defect in the method of root-filling." Dr. W. Storer How says, "Enlarge openings with minute drills, patiently persist in reaching the foramina with gauged, smooth, flattened, spring-tempered steel probes, small enough to follow and push tin-foil shreds the entire length of any root-canal the opening of which is accessible after the requisite number of hours' or days endeavor." As to abscesses, he has had "two instances among teeth of every character in a quarter of a century of complete canal-filling." Dr. Baldwin enlarges, cleanses, and fills, and has had only two abscesses in eight years. Dr. Noble uses antiseptics for some days and fills with oxychloride, and thinks not over ten per cent. return abscessed. Dr. H. A. Smith enlarges the canals at their openings only, and pumps in oxychloride of zinc, following with gold or copper points. Speaking of abscesses, says very few occur "if thorough antiseptic precautions are employed. This means exclusion of saliva from first to last. It means clean broaches, clean cotton, clean fingers, clean everything."

What deductions shall we make from the foregoing? Whereas in the first condition we found so many opposing reamers, now we find nearly all advocating their careful use, at least in the beginnings of the canals. To persist too far with a drill, reamer, or other similar instrument in buccal roots is to run the risk of perforation. We also find here that by depending upon disinfectants, antiseptics, and the like no evil is expected by the operators, although they may be compelled to leave the entire dead pulp in the buccal roots. What value there can be to disinfectants I cannot see. The pulp has been devitalized by the operator, and disinfection can only become necessary where he neglects his patient till putrescence supervenes. Antiseptics may do something. My choice would be to use chloride of zinc, for, besides being antiseptic, it is eminently a mummifier. If the pulp-tissue remaining in the buccal canals could be certainly mummified, there could be no better root-filling. But to permanently mummify a body in the presence of moisture is a doubtful possibility. Nevertheless, oxychloride has proven its efficacy.

We find an almost unanimous assertion that abscess rarely occurs. Dr. Noble places the figures as "not more than ten per cent.," but besides him no one else goes higher than two per cent. Here, then, is a curious fact. Our theories of practice tell us that the pulp must be entirely removed or there will be almost surely an abscess. Yet men whose statements we must accept tell us that in buccal roots where the pulps cannot certainly be removed they still have barely two per cent. of abscess, some gentlemen not having any at all. The explanation to my mind lies in the following facts: The canals being small, their contents must be small, therefore dangers from putrescence are less then elsewhere because there is less tissue, and consequently less putrescence. Then the foramina must be small also, and as a broach cannot pass into the canal, no part of the pulp is forced through and beyond the foramen. At any rate, it seems to be shown by this correspondence that in constricted buccal canals the dead pulp may be left in and so treated that it does not materially affect the health of the tooth. An important deduction from this is, that if it be true, then where we find these buccal root-canals very much attenuated it is reprehensible to sacrifice much of the tooth-structure merely to make them a little more accessible, in order to ream them out a quarter or a fifth of their length. If we cannot reach the foramina, we need scarcely make strenuous effort to remove so little dead tissue.

Condition third is described, "Pulp devitalized by operator, and patient absent from the office for a number of days. After removal of the pulp in a partly putrescent condition from palatal canal, pain is reported if pressure be made by an instrument at the extremity of the canal.'' The first query is, ''How do you account for the pain?'' Dr. Ottofy says, ''Penetration of gases through root into tissues beyond.'' Dr. Black says, ''Pulps not all devitalized, or material pushed through. Products of decomposition have rendered the tissues sensitive.'' By his first alternative Dr. Black has shown that he did not take my meaning fully. The description of the condition begins, ''Pulp devitalized''; besides, farther on I say, ''Pulp removed in a partly putrescent condition.'' I do not suppose that Dr. Black would have us believe that under such circumstances a part of the pulp remains alive. Yet this is a good point for discussion. When we devitalize a pulp, there is some point where the living and the dead must separate, and that point is usually just exteriorly to the foramen. Can it be that occasionally a pulp may separate within the canal, leaving, as Dr. Black suggests, an extremity which is still alive? Dr. J. Allen Osmun says, ''Inflamed peridental membrane.'' Dr. Thomas L. Gilmer says, ''It may be caused either by the instrument passing through the end of canal, touching hyperæmic peridental membrane, or by touching a part of the dead pulp which had not been removed and through this communicating pressure to the hyperæmic tissue beyond, or by a small portion of pulp-tissue which has resisted the destructive influence.'' This operator distinctly says that a part of the extremity of a pulp may resist death. Dr. Cigrand attributes the pain to gases from the dead pulp passing through the foramen, and says this is due to sealing the destructive agent so tightly in the cavity as to imprison any gases which may arise during a protracted absence of a patient. Advises a patient not to leave cotton in tooth over thirty-six hours. Dr. Eubank says, ''Inflammation of the pericementum.'' Dr. Thompson calls it ''Inflammation due to septic poisoning.'' Dr. Cushing ''thinks it is a column of air forced by the plugger into the apical portion of the canal, and against the tissues beyond, which are in a condition of subacute inflammation and responsive to very slight pressure.'' Dr. Houghton counts it as ''either the effect of arsenic, or dead matter from the pulp.'' Dr. Nash says, ''Pressure of gases from putrescent pulp.'' Dr. Darby has not had the experience where he was positive that all the pulp had been removed, and attributes it to there being some of the pulp remaining. He does not state whether he means alive or dead. Either might cause it, according to opinions of our correspondents. Dr. Davis says tersely, ''Pulp not completely devitalized.'' Dr. Fillebrown attributes the pain to ''Inflammation of nerve-fibers at the point of amputation.'' Dr. Straw says, ''Inflammation immediately about the apical foramen.'' Dr. Clifton agrees with Dr. Straw. Dr. Baldwin agrees with Dr. Cushing, and says air-pressure. Dr. W. Storer How says, ''The instrument acts as a piston to syringe contents against neural peripheries.'' Dr. Conrad says, ''Carelessness in forcing instrument through foramen.'' Dr. Smith thinks it is either the instrument or a column of air pressing against tissues beyond.

Of course, all of the above replies are more or less correct, in that any one of them may be responsible for a response of pain. Most are rather indefinite. To those who say that an instrument or a column of air passing through causes pain, the query could still be asked, ''But why?'' To those who say inflammation from arsenical or septic poisoning, I might say, Why does this not occur where we have true abscess, the surest symptom of septic taint? Drs. Fillebrown and W. Storer How I think have given the only true answers. The former says, "Inflammation of the nerve-fibers at the point of amputation;" and the latter says, "The instrument acts as a piston to syringe the contents of the canal against the neural peripheries," which covers the whole field in a moment, except that a column of air will be as painful as the contents of the canal. The evidence of this is that often there will be no pain from work with an instrument, but immediate complaint when the canal is thoroughly sealed with a root-filling, causing removal of the filling before relief is experienced.

The next query is, "How do you treat it?" In this painful condition Dr. Ottofy cleanses the canal and uses eucalyptol and iodoform, placed loosely, and cavity not hermetically sealed. Sometimes applies tr. aconit. rad., chloroform, and carbolic acid, equal parts, to the gums, or recommends a raisin poultice. Dr. Black's ideas are quite different. He uses his 1-2-3, and seals it in tight, leaving it undisturbed for one week. Dr. Osmun uses disinfectants and soothing applications. Dr. Gilmer cleanses canal, using peroxide of hydrogen, and dresses with oil of cajuput inserted on cotton packed lightly. If tenderness persists after three days, uses carbolic acid 95 per cent. at extremity as an obtundent; this failing, dresses entire canal with cotton slightly moistened with carbolic acid, repeating till cured. Dr. Cigrand depends upon Dr. Black's 1-2-3, and dresses with cotton saturated with kathormon; bathes the soft tissues with aconite, iodine, and cocaine; dismisses the patient for fifteen hours, and renews treatment if necessary. I may as well state here that Dr. Black's 1-2-3 is composed of carbolic acid with wintergreen and acacia oils. Dr. Meeker uses counter-irritants. Dr. Eubank dries and cleanses thoroughly, packs canal with absorbent cotton moistened with campho-phenique, and seals with gutta-percha for twenty-four hours. He says that if on return of patient there is no odor, and tooth is no worse, he fills canal with tin. Dr. Thompson washes out with peroxide and dresses frequently with a mixture of equal parts of iodine, carbolic acid, and glycerin until all soreness has subsided and pus disappeared. Dr. Cushing uses disinfectants in the canal, and on the gums aconite and morphine, or saturated solution of menthol. To those who wish to use menthol I may say that it is most efficacious mixed in benzoinol or in liquid vaseline, twenty grains to the ounce. Dr. Houghton depends upon repeated dressing with carbolic acid. Dr. Nash cleanses canal with saturated solution of soda carb., and leaves canal open, placing loose cotton in cavity to prevent ingress of food. This is repeated for two or three days. Dr. Darby uses solution of permanganate of potash, and hot-air blast. Dr. Davis gives the tooth time, and an escharotic. Dr. Fillebrown says astringent solutions, and mentions creasote, carbolic acid; then he says iodine also, but does not state whether he means applied to the gums or in the canal. Dr. Straw uses cocaine for half an hour, and then destroys sensibility by use of a platino-iridium cautery at red heat. Fills at same sitting. Dr. Clifton cleanses with peroxide of hydrogen, and dresses for a few days with oil of cassia and aristol. Dr. Baldwin cleanses thoroughly, dries thoroughly, and fills at once. Dr. How removes the contents of the canal, to whose presence he attributes the pain, and uses sterilizing fluid. Dr. Conrad does the same. Dr. H. A. Smith uses no irritant antiseptics until canal is rendered antiseptic. Prefers oily antiseptics, as cloves, cassia, eugenol, myrtol, etc.; dresses with one of these, and gives parts what he terms physiological rest.

This set of replies shows that all men use different medicaments, though choosing agents belonging to the same class, and that all seem to be successful. If this be true, one may choose that which he prefers. It is odd that remedies are reported as potent by good observers, which are impotent in the hands of equally skilled men. I may mention that one medicament, not enumerated here, has done for me in extreme cases what other remedies had failed to do, viz: effected a cure. This is iodine, full strength, in the canal itself, with application of a powerful dose of iodine and aconite to the gums. As a further precaution I give my patient a vial of benzoinol and menthol, which he may use on the gums should the pain recur during his absence from the office, especially during the night.

In view of the fact that immediate root-fillers made their voices sound loud in the land only a short time ago, it seems singular that in this report we should find but two who practice it in the case described.

The next query is, "Would you fill the root if even after repeated treatment the painful symptom persists?" Dr. Ottofy says he would not, and adds, "have sometimes forced an acute abscess as a final remedy." Drs. Black, Cigrand, Meeker, Houghton, Darby, and H. A. Smith say no to this. Drs. How and Conrad say the pain will not persist. Drs. Davis, Nash, Eubank, and Osmun have done so successfully. Dr. Gilmer thinks pain will usually subside after treatment, but "if apical foramen were large, and the sensitiveness was caused by wounding tissues beyond, which would probably be shown by hemorrhage, then, as soon as I had decided that this was the case, would fill the root if aseptic." Dr. Thompson says, "If pain is pericemental, no, but if from contact with living tissue at end of root, yes." Dr. Cushing says, "If after two weeks of careful treatment there were still pain, should pack tight with cotton saturated with oil of cassia, adding perhaps a little morphia. If no trouble after a week or two, should then fill." Dr. Fillebrown says, "Would if other conditions were favorable, first, however, with a test-filling." Having agreed with Dr. Fillebrown as to the causes leading to the painful symptom, I also agree with his treatment. Where pain persists after several treatments, there should arise the question whether the treatment were not preventing a healing. As Dr. Fillebrown says, try a test-filling. I should first pack the cavity with dry cotton, packing it tighter and tighter, with great care to see if air-pressure caused pain. If not, I should fill the root at same sitting, removing the cotton test-filling and substituting gutta-percha cones, using small ones and several, rather than one large one. Should the test-filling cause pain, I should remove it and dress with the solution of menthol till pain subsided, as it would in a few minutes, and then fill with waxed floss silk dipped in chloro-percha and laid aside to harden by evaporation of the chloroform. This gives a fine cone of gutta-percha which, having a strand of silk within it, renders its removal easy. In packing it, chloro-percha is pumped in first. This may be injected without causing air-pressure, and when the canal is filled with it, the cone having the silk in it may be carried to place usually without causing pain. This may be left in permanently if no cause for its removal supervenes, but where excessive pain should ensue because of the silk, the entire root-filling is easily removed. The end should be left projecting from the canal considerably, being packed in the bottom of cavity. I asked this query to discover if any others, like myself, have hit upon the above method of filling with gutta-percha so that it may be left undisturbed or removed readily. I find that most of the writers make no special difference in their filling of this root, except that a larger proportion than before recommend gutta-percha, most of these using the cone in combination with chloro-percha. Dr. Meeker seems to be pessimistic about this class of teeth. About filling the palatal root which is painful, he says he "lets it go." He does the same with the buccal roots, which are inaccessible, and finally thinks that five per cent. of them will abscess. The next query refers to the buccal roots: "What do you do with the buccal roots?" Dr. Fillebrown says "he opens the buccal canals as far as possible, and fills as far as possible. With others he does not interfere, because he cannot." Sixteen others practically agree with this, some admitting plainly that they "do nothing," others doing the best they can, disinfecting where they cannot fill, etc. Dr. Straw says tersely, "Fill buccal roots, of course;" Dr. Ottofy also fills them. He says, "Frankly, if I open into a pulp-chamber myself, I seldom fail to enter every canal, though it sometimes takes two or three sittings to do it." Dr. Conrad says, "Fill them in all cases," and italicizes the words. Dr. W. Storer How also "gains access and fills them." It is gratifying to find that some gentlemen can fill all buccal canals that reach them, and this is an incentive to others to try to do likewise. It is more gratifying to learn that these difficult roots can be left to themselves with a fair chance of continued good health.

The last query on this head is, "What proportion of these teeth return abscessed?" As we should expect, those gentlemen who report that they can fill these roots, also report no abscesses. As before, the majority report very few, if any, abscesses, though Dr. Cigrand says they are critical cases, and Dr. Davis thinks them liable to severe after-troubles. As before stated, Dr. Meeker thinks about five per cent. abscess. This agrees with what several say, that this tooth is more apt to abscess than that described last.

Condition fourth reads, "Tooth filled by some other dentist. Is found aching. Filling removed and pulp found to be dead and putrescent. A discharge of pus through canals. Buccal canals tiny." The first query is, "Do you use reamers?"

Drs. Straw, Conrad, Fillebrown, Thompson, Osmun, Eubank, Nash, Clifton, Houghton, and Darby use reamers. Dr. Darby is opposed to the use of reamers in the engine except where the canal is certainly straight. Prefers hand-drills in doubtful cases. The other gentlemen are opposed to reamers, or only use them at the opening of the canals, which from the standpoint of the query is practically a negative reply. Thus we have ten prominent men who use reamers, and ten of equal prominence who do not, the odd man not having replied to the special point. To my mind it seems odd that there should be so much opposition to the use of the reamer in this condition. If septic matter has been in a tooth-root till infection and pus have ensued, it is plain that the canal-walls are either softened or at best saturated with septic matter. Removal of this by enlargement of the canal is not only wholesale sanitation, but leaves the disinfection of the rest of the tooth more possible because more access has been attained. The one argument against this is the fear of penetrating the root, an accident which should never occur in skillful hands. The next query is as to the filling, and reads, "Do you fill canals at first sitting?" Drs. Gilmer, Cushing, Meeker, How, Ottofy, Smith, Noble, Baldwin, Clifton, Black, Cigrand, Davis, Straw, Fillebrown, Thompson, Osmun, Eubank, Nash, and Houghton all say no. The last-named says he has done so, and learned a lesson. No more such work in future. Dr. Conrad says, "It may be done with safety, provided there be time to do it thoroughly. We do not usually have time." The unanimity with which these gentlemen condemn immediate root-filling in these cases is instructive. Next I ask, "Do you operate through the gums and process to relieve the pericementitis?" It must be remembered that this is the condition commonly known as blind abscess, there being no fistulous opening. In reply, Drs. Fillebrown, Meeker, and Baldwin admit that they might adopt such a course as a *dernier ressort.* The other eighteen gentlemen oppose the method. This is one more of the theories advocated by the immediate root-filling men. As they stop up the root-canal, they claim that it is wise to manufacture a fistula, keeping it open by a tampon, and thus leave the tooth ready to be filled at once. It is significant therefore to find twenty-one prominent men all opposed to this. Yet it is but fair to call attention to the fact that we are dealing with a three-rooted tooth, and the uncertainty of effecting perfect drainage through a single fistula made by a drill might make them decide against what they might do in single-rooted teeth. The next query on this is, "How do you fill these roots?" The replies are practically the same as already described, except that more need for antisepsis is advocated before the filling. I inserted this query to see if others place a permanent disinfectant in the canal at the time of filling. I use Van Woert's paste here, greasing my gutta-percha cones with it and so carrying it into the canal. I use a hot-air syringe newly placed on the market, designed by Dr. Richmond, with which I can get a canal so hot that when I insert a cone cold it retains its stiffness only long enough to enter the canal, when the heated condition of the walls softens it so that it is readily pressed to the extremity. Sometimes the mass becomes quite plastic under manipulation, in which condition the iodol paste I presume is mixed into the mass, which is no detriment. I pass around the hot-air syringe referred to, which I now consider invaluable, being useful also to obtund sensitive dentine in those cases which can be controlled by dehydration. There is a hollow cylinder in which medicated cotton may be placed, and the stop-cock allows of filling up the air-bulb and the directing a continuous blast of air where needed.

Condition five is "similar to the last with fistulous opening, the buccal roots being involved in the abscess." The question is, "The buccal canals being very minute, can you cure the abscess?" Dr. Black says, "Yes, but always with the proviso that some abscesses are incurable," and twelve others take the same favorable view, some being quite emphatic as to the cure. Drs. Cushing, Noble, and Eubank say they can cure if they can make medicines pass through the canals. Dr. Nash thinks there is no assurance of cure. Dr. Cigrand says, "In many cases, but not in all." Dr. Darby says, "I should not expect to cure the abscess treating through the buccal roots. Should expect better results treating through the fistula," a statement with which I heartily agree. Dr. Smith says, "Not always." Dr. Clifton says, "Don't think abscess can be cured if canals are too small to admit smallest broach;" and Dr. Thompson says, "Not if external and canals cannot be well opened." Although the majority here report that they can cure these abscesses, I should operate as Dr. Darby advocates, through the fistula, surgically and otherwise, but should expect absolute cure in only a very few cases, where, as described, the buccal roots were involved in the abscess and their canals inaccessible.

Asked how these cures are effected, the replies are as follows: Drs. Black, Conrad, Osmun, Straw, Davis, Ottofy, How, Baldwin, Meeker, Cushing, Nash, Noble, Smith, Thompson, and Clifton depend upon medication from within. Several like to see their medicament emerge through the fistulous opening, being pumped in at the oral end of the canal. Creasote, carbolic acid, chloride of zinc, and iodoform are spoken of in this connection. Dr. Houghton practices immediate root-filling, and then treats abscess through fistula. Drs. Fillebrown, Cigrand, and Darby treat through the fistula, and Drs. Eubank and Gilmer do the same, and if the abscess does not yield, they advocate amputation of the end of the root or roots. This seems to be quite sensible in view of the condition of the buccal roots, having inaccessible canals filled with septic matter. In reply to the question, "Are these cured or temporarily relieved?" Drs. Black, Conrad, Straw, Ottofy, How, Cushing, Thompson, and Fillebrown call their cases cured. The others are not so positive, and think relieved a good word. Thus thirteen out of twenty-one gentlemen are quite doubtful of curing these abscesses.

The next two queries are as to filling the roots, and the use of reamers. The replies are similar to those given in connection with the other cases.

The last condition is as follows: "When a reamer or drill has been used, and a hole made through the tooth other than at the foramen, and an abscess has formed, is it curable? How do you proceed?" Dr. Fillebrown says, "Very unfavorable. Curable sometimes. Cover the drill-hole with gold or gutta-percha, being careful not to project it through, then fill as in other cases." Dr. Thompson says, "A perforation is not curable in the sense that the opening can be closed by restoration of lost tissue. But after allaying the inflammation and destroying all septic matter, and filling carefully with chloro-percha, nature will tolerate the tooth perhaps indefinitely." Dr. Cushing thinks the abscess can be cured just as one where there is only the ordinary foraminal opening. Dr. How removes the other man's root-filling and fills with gauged pluggers and lead foil. "Have made cures. In no instance found extraction necessary." Dr. Ottofy cures these cases. After finding where the perforation is, be careful not to pass instruments through. Treat as ordinary abscess, dressing with Black's 1-2-3, and covering the perforation with iodoform; fill with thin oxyphosphate, using no pressure. Dr. Straw also cures these cases. He fills with that non-irritating filling, Hill's stopping, and if necessary removes the abscess-tissue with engine-bur. I may say here that this would be decidedly difficult where, as is usually the case, the perforation is in such a position that the abscess-tissue is between the three roots.

Dr. Davis has seen three such cases, which he cured, and which have not given trouble in two years. Dr. Nash thinks prognosis doubtful. Has a case which came to him recently from another dentist (the place, by the way, where all these cases usually originate), and he treated in spite of hemorrhage, finally filling the tooth. Occasional grumbling reported since, but no abscess. Dr. H. A. Smith thinks much depends upon the position and character of the aperture, and adds, "Success depends upon complete closure of the opening with a non-irritant substance, without pressure upon outer tissues; if hole is not in plain view, this is a doubtful possibility." Dr. Clifton says the abscess is curable, but believes it will be apt to return after filling the canal. Dr. Cigrand says, "Nine out of ten such cases, unless very delicately treated, are failures. Uses probational dressing of iodoform." Dr. Gilmer thinks cures possible, but extremely rare. "Care must be observed not to force filling-material beyond the junction of dentine and cementum." Dr. Darby has seen this condition only in teeth other than the molar, and from analogy considers it very difficult to cure. Dr. Houghton thinks the abscess incurable. "When it can't be cured, and no longer endured, use forceps." Dr. Noble says, "If any fool has drilled a hole through a root, it is very doubtful whether the damage can be repaired." Dr. Black says he "cusses the fellow that made the hole."

It is my own feeling that these are desperate cases, very rarely curable, even by the most skillful.

Discussion.

Dr. W. C. Barrett. I wrote an answer to that circular letter which I did not send, because I did not believe that the majority always knows best. I do not believe that any two cases ever present exactly the same aspect, and I think they never should be treated under all circumstances alike.

In regard to the idea of settling questions by vote, I cannot concede that it can be well done. The matter is presented by the different gentlemen who were consulted,—men who were competent to decide it; yet I cannot conceive that their vote can affect my practice in any way. My cases may be entirely different, and consequently such statistics as these have comparatively little value. The opinions of these men have been given in a very concise manner. However, the whole matter has been so thoroughly presented that it must give a basis for thought; but to give it as an expression of opinion of the Dental Society of the State of New York, I should most peremptorily object to it, as one of the individual members. It is not necessary for me to speak of the points brought up in regard to the treatment of the different cases. I want to compliment the correspondent on the industry displayed by him in obtaining these opinions, but I want to enter a protest against their being given out as methods which should be indorsed by authority of the Dental Society of the State of New York.

Dr. W. Jarvie. I must disagree almost entirely with our good friend

Dr. Barrett. I approve most heartily of the method that Dr. Ottolengui has taken to get the views of different men on the treatment of pulp-canals, and I think the result of this effort is of great value in formulating an opinion. How are students to know what is considered the correct mode of practice, if it is not by a study of the experience of other men? There are exceptions to all cases, and the differences of condition must be taken into consideration, but I think we can formulate principles to govern us in the great majority of cases, and I think the report of the treatment of roots under the various conditions stated in the questions is one of the most valuable contributions we have had. These are the opinions of eminent men, and they should govern us very decidedly in our treatment of roots under varying conditions. It is not necessary that we should accept them individually, but I think they are valuable to us as guides. I do not think the answers are as varied as you might suppose. Dr. Ottolengui has said, while out of the twenty-one answers there are a great variety of remedies to be used under the same conditions, the classes of remedies were very much the same. Some might prefer as an antiseptic creasote, some chloride of zinc, some eucalyptus oil; but the class of remedies is nearly the same. Some men feel that they get a better result from one remedy than from another. Some persons can accomplish a better result with one agent than they can with another. I consider the report not only a very desirable thing to have, but a very valuable one. I only wish Dr. Ottolengui had received answers from a great many more gentlemen. I think many throughout the country would have been pleased to answer the questions.

Dr. E. A. Bogue. I am very glad to be able to agree with the chairman of your committee in so many points, for almost always I find myself utterly disagreeing. He has put forward, as I see it, a number of questions which it was utterly impossible to have answered, and he has failed in particular to get at the principle of things. I received that circular, but it was beyond me. I had not the ability to answer the questions. To begin with, he asks what shall be done when the operator destroys the pulp. Your chairman fails to mention in his circular the fact that sequestration will take place after the application of caustic, within a given number of days. Everybody knows that a scab comes off eventually. We all know that when arsenic is put on the pulp of a tooth, the pulp not being inflamed, within from six to eight days slough will take place. Putrefaction will not have commenced until after that period. Hence, if arsenic is applied and six or eight days allowed to pass, and the pulp is then removed by the operator, he will take that out, and the living portion will not be left in a condition to show great hemorrhage. That is dogmatic. Another point I am thankful to him for mentioning: he spoke of upper teeth. What about the lower ones? When upper teeth are lost, we can put in substitutes good for something; but how many gentlemen in this room, in this Empire State, undertake to put in very many partial lower plates? I should really like to know. Not that it cannot be done, but I think everyone present would rather avoid them, if he could do so conscientiously. When the question comes up as to preserving teeth, the lower ones are of more consequence than the upper.

Again, a little matter of physics, perfectly well known to everyone in the room. Water has a tendency to run down hill; so has every other fluid, whether the fluids of putrefaction, or otherwise.

Another question comes up: What is it that hurts after arsenic is taken out? What would hurt if the scab caused by applying arsenic to your finger had been taken off? Pain is a danger signal every time.

The gentleman has made his report as to what to do under given circumstances, but I fail to catch, if he stated it, what is the cause of pain, or what is the cause of an abscess in the tooth whose pulp has been devitalized; and until that cause is clearly put before us, it seems to me the question of what to do cannot be definitely answered. Some years ago a gentleman placed a patient in my hands, saying that for two weeks he had treated the right upper molar, endeavoring to remove the pulp, and he was unable to do so. The pain continued. A little nettled at his lack of success, he sent the patient to me. I uncovered the opening to the anterior buccal root, and at once was able to remove the pulp of the same. I have since then had a number of such cases, among them a patient from a most admirable operator, whose opinion I respect very highly. He sent a lady to me for one or two applications. He said in his letter that the pulp was ossified, and he did not know what to do. It did not take me more than ten minutes to expose the pulp, and to put some arsenic on it. This shows that there are differences in our ability and in our methods.

In his report the chairman does not state what causes abscesses, or why they occur after the death of the pulp, and he also fails to state what the use of antiseptics means. It seems to me that in his report he has given material for this society to make a most admirable series of papers and discussions that will be of great value for many years to come.

Dr. Barrett. I do not wish to be understood as expressing any disapproval of this method of gathering statistics. Not at all; but I do think that endeavoring to draw a line of practice which shall be indorsed as the correct one in every case, is beyond our scope. Let me add another thing: You have seen in many cases, and I have demonstrated it, a kind of Haversian system through the dentine of the roots of growing teeth. The entrance to the pulp-canal is not exclusively through the open foramen. I believe it is very seldom the case that there is a round, open foramen, and those cases which you see in the books in which the artery and the vein are seen passing out beyond the pericementum are all wrong. Very frequently in growing teeth you will find that the Haversian canal enters from the pericementum, which in my opinion supplies the pulp with its blood which enters through the side of the tooth, or in a bicuspid or molar enters at the bifurcation of the roots. Thus, in destroying the pulp, the point of infection will be at the bifurcation of the roots, and the treatment at the extremities amounts to nothing. The point is somewhat near the side of the root, or at the bifurcation. I believe it to be a fact that that is the anatomical condition, and in no case is the supply through the open foramen.

Dr. O. E. Hill. I am glad that Dr. Barrett explained himself, for I thought he was misunderstood. I look upon the report as very valuable. What does it show? It shows in a plain, practical way that dentists differ comparatively little in their methods of treatment.

They may differ slightly, but, as a rule, they vary very little in their opinions. It is not necessary to vote on it. Every gentleman in this room knows that those views are the same as his own. It is a plain, simple process, and we all do just about the same way. This matter of applying arsenic: Are there not many gentlemen in this room who have applied arsenic to teeth half a dozen times, and yet did not get any relief from it? Twenty-four hours, as a rule, will destroy a pulp to within a short distance of the end of the root. I do not like the word apex. I say the end of the root. Everyone who has used it knows that, as a rule, twenty-four hours after its application, arsenic, if properly used, will destroy the pulp, showing in extracting it that it has not reached such a point of decay but what it will hold intact when the broach gets hold of it. The pulp will be congested, except at the end, where there will be a little white point. I do not mean perfectly white, but light in comparison with the surrounding parts.

I want to congratulate the correspondent on the answers he received. I am sorry I did not answer the questions myself. There are so many conditions to be observed when you give an answer that it is almost impossible to do so fully. The correspondent has been perfectly fair, and has given everyone the benefit of a doubt, if there was one.

Dr. R. M. Sanger. This matter of pulp-filling is one which has occupied the valuable time and attention of societies all over our land for a number of years, without any satisfactory solution. The reason shows itself in the results obtained by Dr. Ottolengui's method. That is, that there are no two exactly similar conditions, and when a gentleman undertakes to write a paper on the subject of the treatment of exposed pulps, and the filling of canals, etc., he assumes one condition only. Dr. Ottolengui's paper has shown that there are a number of conditions varying greatly, one from the other. This method of securing statistical results is of great value, and should be followed up. As I understand it, the question raised here is whether this society could pass upon a stated method, because of the opinions given by these gentlemen. I think the result shows clearly that it is impossible for this or any other society to settle questions of this kind; but we can, by a system of this kind for collecting data, reach conclusions which may prove to be of advantage, and in a measure educate the coming generation of dentists, so that they may not make the blunders we have made. I am much pleased with the circular, and I believe it would be wise for this society and other societies to continue this method of inquiry, looking to the establishment of general rules of treatment.

Dr. F. French. I have listened to this report with much pleasure, and with considerable profit; but connected with it there was a feeling of sorrow and regret. When a man fills all the roots of a molar successfully, he is a little too perfect. There is a large proportion of superior molars that very few men could take out of the mouth and fill successfully; and it becomes next to impossible when they are in the mouth and the conditions are still more difficult. I believe there is much harm done by sending out these ideas, claiming perfection of operations in such cases.

Dr. Edward C. Kirk. We have had a very interesting object-lesson, which will serve as a text for what I want to say. As long as

I have been in dentistry, whenever the question of filling root-canals has come up for discussion in dental meetings which I have attended, we have had just about the same result as here shown ; that is, every man meets with about the same degree of success in filling the canals of pulpless teeth, whatever his method may be, and we have every variety of practice, from no filling at all, through the whole gamut of every possible material that can be used for the purpose. There must be some reason for this.

We cannot doubt the statements as they are given, and there must be some reason underlying this uniformity of success, as claimed, that we ought to get at,—a fundamental principle, which will enable us to arrive at a more uniform method of practice. During last winter, in conversation with Dr. Ottolengui, I outlined to him a plan which had been forming in my own mind for getting the opinion of the whole profession throughout the United States upon certain details of practice, among others the question of filling roots of pulpless teeth ; and in order to get these opinions, I suggested, as I did in an editorial in the DENTAL COSMOS of April, 1892, that the governing dental bodies of the United States should select certain topics, and a list of these be furnished to local organizations for systematic discussion. Let a report of the discussions in each of these local organizations be sent to the American and Southern Associations. Let them there be digested, and the digested reports widely published, so that individual practitioners could by this means get the consensus of opinion of the whole profession with respect to certain lines of practice. I want to answer Dr. Barrett's objection to this scheme, so he will have no further misapprehension with regard to what was meant by it. The whole idea was to be educational in its outcome. The word "authoritative" used in the circular meant that the American Association should give authority not to any method of treatment, but to the list of topics sent out for discussion, so that we should have a large number of facts from which to compile a report which should contain the results of methods in vogue throughout the United States, and which could be published for the benefit of the profession.

The result of the paper shows that we either know all about it, or very little about it. We all agree that individual cases need individual treatment ; but underlying the treatment of these we have pretty well established the questions of asepticism, the relations of pericemental inflammation, certain physical essentials of the root-filling material, etc. But cannot we go still further and reach generalizations that will help to avoid so much of diversity in our methods of practice? It was to the ends as noted that I made the suggestion which Dr. Ottolengui has carried out in reference to this work.

Dr. M. L. Rhein. I do not think there can be very much doubt that reports of this kind are bound to be very valuable, if for no other reason than that of allowing us to compare our methods of practice with those of other men. There was, in the practical part of the discussion on the subject, a point or two that I would like to touch upon, and one that the chairman of the committee made when he stated that in case of the buccal roots of the molars, where the roots were of small caliber and the operator is incapable of penetrating to the apices, he saw no objection to enlarging the opening of such canals. He took the replies of the gentlemen who answered him, where they simply enlarge the openings of the canals, as being a negative reply to the query as to whether they reamed out canals at all. I distinctly object to that conclusion of the chairman of the committee, and I base my objection on the point that was last brought out by Dr. Barrett, and that is, the large number of cases in which a Haversian system is an important factor to be taken into account in the treatment of canals.

I believe that there are a large number of canals that it is impossible to reach the end of, but the only way to determine that is to make a free opening to their entrance. Another point that was brought out is irritation around the foramen, that is so frequently met with. I think the report that was attributed to Dr. Straw brings out a method that solves that question to a considerable extent. I have not used arsenic for the removal of pulps in over two years, and I do remove a large number of pulps that are in a very sensitive condition, and without much inconvenience to the patient. I do not believe in the use of any material so irritating as arsenious acid. I have seen many cases of inflammatory action when the pulp itself had become absolutely inert, but the irritation had extended beyond the apex. The extensive use of the cocaine products in the past few years seems to me to be supplanting the use of arsenious acid for pulp-extirpation, and in regard to the hemorrhage which Dr. Bogue wisely said would be avoided by waiting a sufficient length of time for a slough, I think that is the only objection I have heard raised to the cocaine method. There are so many of these preparations that will control the sensitiveness in a very few minutes, that I have never found it necessary to wait for another sitting to get rid of this condition.

Dr. L. S. Straw. When Dr. Hill was speaking, I had the same feeling about arsenic that Dr. Rhein has just pronounced, and I have used it as little as possible. Dr. Hill spoke about a pulp in a cuspid to which he had applied arsenic half a dozen times, and still could not touch it. If I had happened to be so foolish as to have applied arsenic half a dozen times, I would then have applied muriate of cocaine in crystals, and have destroyed the pulp in thirty minutes, and have filled the root in ten minutes more. If any of you have never tried any form of cocaine, I want to advise you to do so.

Dr. Ottolengui. We have had an extraordinary evidence of the advantage of sending out papers in advance. The discussion of this report has in a number of instances drifted from the subject of it. There is nothing in my report that says anything about arsenic. I spoke of devitalized teeth, and I said most distinctly that that word was used to cover cases where arsenic or anything else had been used. One gentleman has said I have been remiss in not explaining what was the cause of this pain. One of the queries is, "What do you think is the cause of the pain?" and I got twenty-one replies from twenty-one different gentlemen in answer to this. I did not intend to give my own opinion, but the opinions of other men.

As to the advisability of having a vote on these opinions, that is not before the society. In starting this work, I sent out a circular with the idea that we might ask for a vote; but in my report I do not ask the society to take a vote on it, because after the result of my work I considered it unwise to do so.

Many prominent men tell us to fill all roots immediately; get your root in an aseptic condition, and insert your filling. Is it not instructive to find that twenty-one gentlemen oppose that idea? It is not the difference of opinion, but it is the acquiescence in one theory that brings us to a point of value, and if this were the only point of value achieved so far, it seems to me it would sufficiently defend the object of the circular.

From the replies received, you will find that they do not all practice immediate root-filling in all cases. If the report is studied carefully, it will show that there are a number of cases presented which prove that such a report will bring about results of value.

(To be continued)

CHICAGO DENTAL CLUB.

A REGULAR meeting of the Chicago Dental Club was held March 28, 1892; Dr. A. E. Baldwin, president, in the chair.

Dr. Arthur B. Freeman read a paper on "The Pathology of the Trifacial Nerve."*

Dr. John S. Marshall. There is very little indeed to criticise in the paper. There are a few minor things that occurred to me as the doctor was reading, that he did not sufficiently emphasize; first, with regard to the causation of neuralgia. I do not remember hearing him speak of the effects of the impingement of peripheral nerves in cicatricial tissue. I have seen several cases of that kind which have been extremely troublesome. One case I recall was placed in my hands by Dr. Matteson some six or seven years ago, where a lady's upper teeth had been extracted with gas, and the operation had been done in a rather bungling way. The dentist had been obliged to operate very rapidly, and had lacerated the gums and broken away the alveolar processes. She claimed that after the teeth were extracted, it was some three months before her mouth got well. From that time she suffered intense neuralgic pains over the right side of the face, involving the infraorbital portion and radiating to the side of the nose and lip. On examination, I found a tender point on the gums directly over the location of the cuspid. Pressure upon that brought on a paroxysm of pain. I therefore made a diagnosis of impingement of a nerve-fiber in the cicatricial tissue, and operated for it by cutting away a portion of the gum and bone, but did not succeed in finding any nerve-fibers because they were so extremely small. I cut it away thoroughly, allowed it to heal, and that was the end of her difficulty. She went to Dr. Matteson afterward and had a plate put in, and has had no return of the trouble.

The general surgeon comes across such cases in his practice. If for any reason he has left a nerve-trunk a little longer than it ought to have been, so that in the healing of the wound it has become inclosed in the cicatrix, then difficulty arises, and frequently he has to make a secondary operation in order to relieve the pain and tenderness. It seemed to me that this point needed emphasis in the doctor's paper.

He spoke of malaria as being one of the causes, and of quite a number of others, but he did not lay sufficient stress upon malarial influences in producing neuralgia. It was my fortune, or misfortune, I might say, to practice for many years in a malarial district, and I saw a great many cases of neuralgia arising from malarial influences, as was proved by quinine curing them without operation.

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* See page 523, current number.

Dr. J. H. Woolley. I would like to know whether you have observed, in the treatment of pulpless and inflamed teeth, difficulty in getting the disease under control; and after filling the teeth properly do you have as good results as you obtain in a climate where malarial influences have not been so great?

Dr. Marshall. I found pulpitis more difficult to control by the ordinary remedies in this district than I have found in any other place where I have practiced. There seems to be a hypersensitiveness of nerve-tissue in these cases, and the ordinary remedies for controlling pulpitis do not seem to have the same effect. Abscessed teeth do not respond to treatment as readily in such districts as upon high land when malaria is not present. While Dr. Freeman was speaking of unilateral neuralgia (and he mentioned a case, I think), he alluded to sweating of the face as a peculiarity. I had one case of that kind come into my hands,—a lady who when she came in contact with the odor of vinegar had pain in the left side of the face from the roots of the hair down to the neck, with profuse perspiration, the secretion standing in great globules over that side of the face. The other side would be perfectly dry, and only the odor of vinegar would establish the paroxysm. That was a peculiarity I had never seen before, and did not read of a case until afterward.

The essayist spoke of hemicrania as one of the forms of neuralgia. If any present have been the victims of hemicrania, they know what it means. It is one of the neuralgic conditions that is likely to be inherited. I think that I inherited it from my mother, and I have suffered with it from childhood up to the present time. Just as sure as I get overworked, these headaches begin to increase in frequency. When I am in my best condition I expect about one in two weeks. I have had them as frequently as four and five in a week, so as to utterly incapacitate me for my business. It is one of the difficulties that there seems to be no remedy for, but I have found many cases in which the exciting cause was overwork and indigestion. People who have chronic dyspepsia are likely to be subjects also of hemicrania or migraine. Such cases are amenable to proper treatment.

The doctor spoke of infantile eclampsia as being caused by imperfect development of the nerve-centers. I should rather take exceptions to that. It seems to me it is likely to be an exalted sensitiveness rather than a lack of development. We know that in little children slight irritations produce convulsions. A cup of sour milk or milk which is just turning, if given to a child, will many times, in an hour or two, produce convulsions. We know that the eruption of the teeth, which under ordinary circumstances would not affect children at all, if occurring when the children are run down or their digestive apparatus is out of order, will produce convulsions. I do not think it is because the nerve-centers are imperfectly developed, but that they are more susceptible to nerve-irritation. The same holds true with regard to hysterical women; we would not say in their case that it was the result of imperfect development of the brain or nerve-centers, but hypersensitiveness of these centers. Little things upset them. They are more prone to faint, more likely to go into convulsions, than people of a stronger nervous organization.

When the doctor related his case of optic neuritis dependent upon pulp-irritation, one very marked case came to my mind that occurred in the practice of Dr. Allport some time ago, and with his permission I reported it. This case was one in which Dr. Allport had filled a superior bicuspid with gold some five or six years before, and the lady had been coming to him regularly twice a year for examination. She came to him at one time for the regular examination, and complained that one of her eyes was giving her trouble. She did not know what to make of it. She was unable to read as she used to do. She could read for a few minutes, and then the eye would be flooded with tears. There was profuse lachrymal secretion, and in a little time it became so bad that she could not use the eye at all. Then it became inflamed. There was pain in the eye, and it gradually increased. Finally she noticed she could not see as well as before, and she became alarmed about it, and consulted an oculist in Chicago. He made an examination, and told her he could find no lesion which would account for the symptoms. Only incidentally did she mention this at the time she came for an examination of her teeth. Dr. Allport made a careful examination of her mouth, but found nothing. The difficulty kept on increasing, and finally she became almost blind in that eye. She consulted Dr. Agnew, of New York, who made a careful examination and told her he could find no cause, and prescribed tonics. He thought she was simply run down, and that perhaps when her system was built up as it ought to be, the difficulty of the eye would pass away. She got no better, and was advised to consult a homeopathic oculist here in Chicago. He told her the same thing. Finally she went to Philadelphia and had an examination there. They simply confirmed the diagnosis of the others, and prescribed tonic treatment also. Finally she came back to Chicago in desperation. She met Dr. Allport on the street one day and told him of her condition. He requested her to come to his office. He examined his record-book to see what he had done. There was one bicuspid marked "nearly exposed," and he said as a venture he thought it would be better to take that filling out and ascertain whether there was anything wrong with the pulp. He found the pulp completely exposed. There was no decay, but there seemed to have been resorption going on that penetrated through the septum between the pulp and the filling. There was no pain in the tooth at all. Heat or cold did not seem to affect it. When opened, the pulp was found to be in a low state of chronic inflammation, and he suggested devitalizing the tooth and refilling it, which was done. In three months' time the difficulty disappeared, and the patient's eye is to-day as good as ever.

Dr. George W. Haskins. I rise not to discuss the paper so much as to speak of a pathological condition of the dental nerve which occurs in my practice and which I cannot explain to my own satisfaction, upon which I would like a little light from the members present.

A typical case is a crown cavity in a molar filled with gold or amalgam. In the course of three or four weeks the patient complains of pain on eating. The tooth itself is not sensitive to percussion. It is not sensitive to thermal change, but sensitive when the filling is pressed upon. I have had these fillings in the mouth for at least three years, showing no leakage, thus indicating there could be no movement of the filling independent of the tooth.

Dr. E. L. Clifford. What did you touch the filling with?

Dr. Haskins. I infer from the question you ask that you would ascribe it to electrical influences. The instrument and filling were both dry and of various materials. It is pressure that does it. The patients complain of pain from eating, and from tapping the tooth I get no response; from tapping the filling I do get a response. The cavities are not so close to the pulps as to cause pressure upon them. They are simple crown cavities, not approaching the horns of the pulp.

Dr. Woolley. How is the articulation of the occluding tooth in relation to the gold filling?

Dr. Haskins. That I could not tell you.

Dr. Woolley. Were there any marks of the occlusion?

Dr. Haskins. Yes; in some cases the occluding tooth had marked the filling, but even then I cannot explain it.

Dr. Woolley. Did you grind it off?

Dr. Haskins. Yes, and with some improvement, but the pain could be induced again by any undue pressure upon the filling.

Dr. Woolley. Did you experiment in regard to the concussion when you brought the teeth together, by placing an obstruction that would strike the enamel alone and not the gold filling?

Dr. Haskins. No; but I did the same thing by percussion with instruments upon the enamel alone, and could get no response.

Dr. Marshall. I have had the same difficulty myself as the doctor speaks of, and I have always laid it to the hypersensitive condition of the dentine itself. I have proved that to my own satisfaction by removing these fillings, cleaning the cavity thoroughly, and swabbing it out with carbolic acid (95 per cent.), and then refilling the teeth, and have had no more trouble.

Dr. Haskins. I have resorted to the same procedure that Dr. Marshall speaks of, and that is the only explanation I can offer in regard to those cases; but it would seem as if the fillings must be loose and move in order to affect the dentine, and in that case they would leak.

Dr. Marshall. I think not, as there is absolute contact there.

Dr. Haskins. I have found in other cases occasionally that if the cavity was filled without wiping it out with carbolic acid, there would be sensitiveness to pressure and thermal changes. I think the cauterization of the extremities of the fibrils is advisable.

Dr. B. S. Palmer. I desire to say one word in connection with the matter that has been referred to by Dr. Haskins. All cavities should be moistened with carbolic acid before filling, for the reason that it prevents a great deal of the extreme sensitiveness we often find in teeth after they are filled. If they are thoroughly dried and saturated with carbolic acid, we will find much less sensitiveness in those fillings.

Dr. S. A. Garber, of Tipton, Iowa. I would like to ask the gentleman if he tried insulating the cavity and then refilling it as a means of checking the difficulty,—insulating with gutta-percha or chloro-percha, then refilling, whether the same trouble would occur.

Dr. Haskins. I did not do so. I have never tried that method in order to prevent thermal changes, except where I suspected close proximity of the pulp.

Dr. Marshall. There is one other point I wish to speak of, and that is with regard to the irritant action of metal fillings in some classes of teeth. In almost all of these cases—and I think the members here will bear me out in this—the difficulty is where the teeth are what we term poorly organized, where they are inclined to be soft and the organic matter is in larger percentage than it ought to be ; or in other words, where the inorganic matter is not up to the maximum percentage. In those cases a gold filling I believe acts as a sort of irritant largely through its power of conducting thermal changes,—not that I mean that it has any irritant effect of itself, but because it is such a good conductor, and keeps up a constant irritation in the fibrils of the dentine. I use carbolic acid of full strength to wipe the cavities with, feeling sure that if I can cauterize the ends of these fibrils and put them in a condition so as not to act as conductors, I can prevent the difficulty complained of.

Dr. Garber. I think carbolic acid is absolutely certain so far as I have tried it, because it keeps contact of metal from the fibrillæ, and a solution of chloro-percha would accomplish the same thing, although I prefer the carbolic acid.

Dr. C. E. Bentley. I want to say first, Mr. President, that I was very much interested and pleased with the exhaustive manner in which the essayist has treated the subject. He has emphasized a point that has laid in my mind for quite a while, and that is the differential diagnosis between tic douloureux and ordinary neuralgia of the fifth pair of nerves. Tic douloureux is erroneously confounded with a great many forms of neuralgia of the fifth pair of nerves, but the one important diagnostic symptom of tic douloureux is its paroxysmal nature. The slamming of a door will cause a spasm of pain in tic douloureux. The stepping upon the floor heavily, a sudden noise, will excite a paroxysm of pain that is excruciating. The characteristics of tic douloureux are not those of common neuralgia of the fifth pair of nerves.

That is one of the important points in forming a diagnosis between tic douloureux and ordinary neuralgia. There is another form of neuralgia of the fifth pair of nerves that is often caused by artificial dentures of the lower jaw in aged people, where the absorption of the alveolar process has been so great that the inferior dental nerve at the mental foramen lies upon the ridge, and there is an impingement upon the terminus of that nerve at that point, thus causing an irritation and consequent pain of a neuralgic nature.

I happened to be present at an operation where it was reasonable to suppose that the exciting cause was an artificial lower denture. The nerve was nodulated at the mental foramen, and the individual had suffered pain for two years and had secured no relief from repeated efforts on part of both physicians and dentists. The gentleman operated by making an excision back to the posterior dental foramen of the lower jaw, without giving substantial relief. He operated again and dissected it beyond the posterior dental foramen, and I lost track of the case thereafter.

In this connection I want to report a surgical procedure that was resorted to by Dr. Andrews, of this city, for the relief of neuralgia of the fifth pair of nerves where all other efforts had failed. This operation was performed three months ago. He finally concluded to remove the Gasserian ganglion, and he did it by a very stupendous operation. He removed the zygomatic arch and resected the muscles, and went back through the foramen ovale to the base of the brain and dissected the branches of the fifth pair of nerves. There has been no return of pain. At first there was a little pain in the upper eyelid, but in two months after the operation the patient regained function. There was no other paralysis, and the parts resumed their functional order. This case was reported in the *Medical Record*. I may say further that such surgeons as Senn and Fenger have condemned the operation.

Dr. E. A. Royce. Mr. President: There are two particular cases the knowledge of which has been of great benefit to me, and which are perhaps worth repeating, as they may assist some one. One case was reported by Professor Garretson some years ago. I have not seen it in print. It was the case of a surgeon in the American navy, the vessel at that time being stationed in Japan. This surgeon was troubled with severe pain inside the brain-case, near the parietal suture. By consultation with the best surgeons he could find in both the American and British navies, it was decided that he was suffering from softening of the brain. He was advised to leave the service and return to his home, supposing that sooner or later he would succumb to this trouble. In his study of the case he found that Garretson said that there was sometimes a terminal branch of the fifth pair of nerves inside the brain-case. With that as a clew he came to Philadelphia to consult Professor Garretson. After some trouble in diagnosis, Professor Garretson extracted a lower bicuspid which had been filled in some of the old countries, and relieved him of his trouble. That one case has led me to see in the teeth troubles which otherwise I would not attribute to them.

Another case came under my own observation while in the old country. A lady applied to one of the operators in the house for an examination of her teeth. She had been complaining for some weeks of pain in one of her feet, which was of a neuralgic character. The operator found in one of the superior bicuspids a cavity with a pulp exposed. After proper treatment of the pulp, the pain in the foot ceased. I kept track of the patient for over a year, and there was no recurrence of pain. We have here two extremes in which the reflex action may give trouble.

Dr. Freeman. Dr. Haskins spoke of the manner of the treatment of cavities which were hypersensitive after filling, and I understood him to say that he saturated all cavities with strong carbolic acid. I would ask if he removes all of the softened, decomposed dentine?

Dr. Haskins. No, sir.

Dr. Freeman. That is just the point I want. I think the deeper cavities should not be saturated with carbolic acid. Why? Because the dentine has an organic matrix, and the process of decay simply removes the salts, leaving the matrix there. If that is properly covered up, my theory is that not in all, but in some cases, the deposition of salts may recur again. Such cases have been known. If the organic matrix is cauterized by carbolic acid, it coagulates the albumin in the matrix, destroys it, and prevents any secondary deposit. I think it is bad treatment in deeper cavities. It is a practice that I do not follow myself; I never wipe out a cavity that is ready for filling with carbolic acid, except it be a devitalized tooth.

Dr. Bentley. What do you use?

Dr. Freeman. I use campho-phenique, the mildest disinfectant there is in dentistry. You can use campho-phenique without getting the cautery effect.

Dr. Bentley. What is your objection to a solution of bichloride of mercury, one in five thousand, or a solution of oil of cassia?

Dr. Freeman. I have no objection whatever to it. I have never used oil of cassia, never studied its effects upon dentine; neither have I used the other preparation, the bichloride of mercury, but I see no reason why it would be an injury. Perhaps that does not answer the doctor's question very definitely. They do not destroy the organic matrix. That is the point I make. Carbolic acid coagulates the albumin. It penetrates the surface in deeper cavities. What is the character of the organic matrix? You have tubules and tubuli; it penetrates these tubules quite a distance.

Dr. Haskins. I disagree with you there. The vital fluids circulate through dentine; decalcified dentine is always permeated by fluids. Oil of cloves certainly penetrates such tissues, and I believe standing fluids do also. Microbes even travel into and through the tubules; and if so, I see no reason why carbolic acid should not enter and saturate where other fluids will, even admitting the cauterizing effect of the remedy.

Dr. Freeman. That is the ground I take. Dr. Woolley has alluded to the influence of root-fillings as being due perhaps to carelessness, or as being the exciting cause of neuralgia. I have no doubt that such is the case, but if practitioners use ordinary care in their manipulations in the pulp-chamber and pulp-canals, thoroughly disinfect them and carefully fill them, they are not very likely to have irritation from them; but if they run the instruments through the end of the root-canals and set up outside an extra apical inflammation, they will have after-trouble. I believe that more reflex trouble comes from improperly filled cavities and improperly capped dental pulps than from all other causes. There is not a week nor a month passes but what some of you gentlemen have occasion to remove the filling of some other practitioner. You find the amalgam packed down into the horns of the pulp, you find it packed into the pulp-cavity itself. That is reckless practice. Dr. Clifford, I think, relates a case where the antrum was packed full of amalgam. I have no doubt about it. I have seen operations that were evidently done by careless, although so-called reputable, practitioners.

Dr. Fernandez. I must take exception to the last remark. I think dentists are often misled by what their patients tell them. When a patient tells me that Dr. so-and-so filled a certain tooth, I often find on investigation it is not the case, and that the patient had been to some ignorant dentist.

Dr. Freeman. I have reported a case to-night where I opened into the pulp-chambers of five teeth and found devitalized pulps, causing intense neuralgia. The last case I reported, the gentleman had been in the hands of a reputable practitioner, a member of dental societies, who gets prices for his work far above what I can command. He gets as good prices as any practitioner here. He used amalgam fillings. Some of them were packed very close to the pulp, if not quite on it, so that in these cases devitalization followed. The patient was going to that office constantly for two years and a half. He did not like to change, but he finally lost his patience. It was careless operating, in my estimation, that caused all of this suffering for a period of two years and a half.

Now, there are other diseases which are primarily affections of the fifth pair of nerves which I did not allude to. There is very little satisfactory, definite pathological literature on neuralgia even in medical works. We have more literature on paralysis than on neuralgia. When we get down to dental literature it all runs along the line of local pathology, and it is good. We will always have just as much suffering from careless operating as we have had in the past, so long as men are grasping after the almighty dollar. So long as dental colleges grind out students without thorough preparation, encourage them to enter college without preceptors, without any preliminary reading, take them through in two years and give them a diploma, just so long we will have a great many neuralgic affections caused by peripheral irritation.

Under the head of "Incidents of Office Practice," Dr. Marshall reported the following cases :

I recently had two cases at the Mercy Hospital which will doubtless be of interest to you. The first is interesting from the fact that I was obliged to improvise a method of treatment while the patient lay upon the table under the anesthetic. The history of the case is as follows : A furnace man, from South Chicago, employed in the Iroquois Furnace Works, was injured while changing the blast from one furnace to the other. Those of you who visit these places know that the amount of pressure of the blast must be considerable in order to make the furnaces work. The pressure is great indeed, but the number of pounds to the square inch I cannot give you. In changing the blast to the new furnace the door was blown off and threw the man about twenty-six yards, striking broadside against a wall, his face especially seeming to take the force of the concussion. The lower jaw was fractured through the angle, and between the first bicuspid and the cuspid of the right side. The contraction of the muscles drew the anterior portion of the jaw backward, so that the middle piece was on the outside and the ends of the others [illustrating]. I could not examine the man carefully when he came into the hospital, as he was unconscious and raving from injury to the brain. The cheek had an incised wound extending from the right angle of the mouth backward two inches. It was four days after he came into the hospital before we could do anything with him in the line of an operation, except to stitch up the wound in the cheek. Had no opportunity to examine him carefully until after the anesthetic was given. I attempted to adjust the intermediate piece with my fingers by getting extension of the jaw by drawing it forward, but as soon as pressure and extension were relaxed it fell back into its old position. If the man had been controllable, a dental splint could have been made which would have held the parts in position. I was anxious to get through with the operation as soon as possible, so was obliged to improvise some method to get extension and maintain it, and still hold the pieces in apposition.

The thought occurred to me to make an incision here and one there, one posterior to the angle and the other anterior to the cuspid [illustrating], and set a couple of screws into the bone. One of the internes was sent out to find some brass or steel screws. After looking for several minutes, he came back with two picture-screws which were one-eighth of an inch in diameter and one and a half inches in length. Holes were drilled into the bone, and the screws set in with the fingers. Ligatures were attached around the front teeth, the jaw drawn forward to its normal position, and the interne held the pieces in position while I measured the distance between the two screws. A piece of cigar-box with a slot cut in either end was slipped between the screws so as to maintain extension. That held it in position, and with a figure-of-8 ligature I wound it around the screws and drew them firmly against the wood [illustrating]. After fastening, pressure was made upon the anterior portion of the jaw to see whether there was any motion, and there was none ; also to see if occlusion was perfect, and it was absolutely so. Dressings were put on, and four weeks from that day the screws were taken out and the dressings removed, and perfect union and perfect occlusion were found. Some little splinters of bone that finally necrosed, were removed on Sunday morning. The jaw is perfectly united.

The second case is a remarkable one from the fact of the great comminution of the bones of the face. The man was brought in last Wednesday morning from the Chicago Packing and Provisions Company's works over at the Stock-Yards. The accident occurred by his jumping on the elevator while it was in motion ; he lost his balance, fell over, and was caught between the floor of the elevator and the beam above, striking him on the side of the face and across the hips. The bones of the pelvis were not broken, but the vessels in the left popliteal space were so injured as to cause a hematoma as large as my two fists. The blow struck him here [illustrating]. The left zygomatic arch was crushed, the malars and superior maxillaries were fractured on a line through the orbits, and the nasal bones were separated from the frontal at the suture. The whole upper bones of the face were loosened from the skull. Diastasis or dislocation was so great as to carry the bones to the right side, the right malar and zygomatic arch being intact so far as comminution was concerned. The right malar was crowded outward and the right superior maxillary wedged underneath it. The lower jaw was fractured on the left side at the neck of the condyle, on the right side between the cuspid and first bicuspid, and also at the angle. The man, strange to say, was conscious when he came into the hospital. I was telephoned for about half-past ten. I asked the condition of the man, and found that he was in shock. Injections of brandy were ordered, with hot bottles to the extremities. I found the man with a pulse of 155. The only way it could be counted was with the stethoscope. The temperature was 97° F. Feet cold. He was given more stimulants, and I stayed with him about three hours, then he rallied sufficiently to be put to bed. I saw him again at about 7 P.M. He kept on improving until I thought we might be able to do something in the way of an operation. I saw him again the next morning, and found him unusually bright. At three o'clock that afternoon we intended to try to put the bones in apposition. There was a good deal of ecchymosis around the eyes, which would indicate brain-injury, but so far there had been no development of brain-symptoms. At three o'clock in the afternoon I telephoned to know how he was getting along, and was told that he was in a bad condition, that it was doubtful if he could live. In the evening I found him on the verge of death. He had been unconscious since two o'clock. He seemed to be drowsy at half-past one, at two they could not wake him up, at half-past two stertorous breathing began, and shortly after seven o'clock he was dead. He died from extravasation of blood in the brain, or else from inflammation of the meninges, but I think likely from hemorrhage into the brain.

I mention the case because it is one of those cases not often seen, in which the bones are fearfully comminuted, and for this reason thought it would be interesting to the Club. In the other three cases that I have treated, the bones of the face were not quite as badly comminuted as in this case. All recovered with so little deformity that it was not noticeable except on a close examination.

DENTAL COLLEGE COMMENCEMENTS.

NORTHWESTERN UNIVERSITY DENTAL SCHOOL.

THE annual commencement exercises of the Northwestern University Medical and Dental Schools were held in Central Music Hall, Chicago, Ill., on Tuesday, April 26, 1892.

The faculty address was delivered by Prof. John H. Hollister, M.D.

The number of matriculates for the session in the dental school was fifty-six.

The degree of D.D.S. was conferred on the following dental graduates by Henry Wade Rogers, LL.D., president of the university :

Charles M. Baldwin.
James L. Blish.
William L. Barnes.
Joseph F. Baird.
Edwin M. Chapman.
Lewis S. Celley.
Adam W. Feltmann.
John L. Foster.
William A. Grove.
Alvah B. Graham.
William F. Garnett.
George B. Hiller.
William E. Merritt.
Augustus G. Miller.
Samuel T. Mitchell.
Clifford M. Roberts.
George E. Warren.
Doctor M. Wilcox.

NATIONAL UNIVERSITY, DENTAL DEPARTMENT.

THE eighth annual commencement exercises of the Dental Department of the National University were held, in connection with those of the medical department, at the Academy of Music, Washington, D. C., on Tuesday, May 17, 1892, at 8 o'clock P.M.

The address to the graduating classes was delivered by Professor J. B. Hodgkin, D.D.S., and the valedictory address by Wm. S. Thomas, M.D.

The degree of D.D.S. was conferred on the following graduates in dentistry by Hon. Arthur MacArthur, chancellor of the university :

NAME.	STATE.	NAME.	STATE.
Wm. E. Bradley	California.	Edwin K. Gerow	New York.
Shelden G. Davis	Ohio.	David E. Wiber	Dist. Columbia.

NORTHWESTERN COLLEGE OF DENTAL SURGERY.

THE ninth annual commencement of the Northwestern College of Dental Surgery was held at the college building, No. 1203 Wabash avenue, Chicago, Ill., on April 11, 1892.

Addresses were delivered by John A. McDonell, M.D., B. Joseph Roberts, D.D.S., and R. E. L. Barlow, M.D., D.D.S. The valedictory was delivered by George W. Westcott, of the graduating class.

The number of matriculates for the session was seven.

The degree of D.D.S. was conferred on the following graduates by B. Grant Jefferis, M.D., dean of the faculty:

George Washington Westcott......Michigan.	Conrad Juan Meyer.......Illinois.
Joseph Augustus Marshall...........Illinois.	

DENTAL SOCIETY ANNOUNCEMENTS.

AMERICAN DENTAL ASSOCIATION.

THE thirty-second annual session of the American Dental Association will be held at Niagara Falls, N. Y., commencing at 10 o'clock A.M., Tuesday, August 2, 1892.

GEO. H. CUSHING, *Recording Secretary*,
96 State street, Chicago, Ill.

PENNSYLVANIA AND NEW JERSEY STATE DENTAL SOCIETIES.

THE twenty-fourth annual meeting of the Pennsylvania State Dental Society will be held at Cresson, Pa., Wednesday, July 20, 1892, at 10 A.M., for general business only.

A joint meeting of the Pennsylvania and New Jersey State Dental Societies will be held at the same place, beginning Thursday, July 21, and continuing for two days. No society business will be transacted at this meeting. Papers will be read by prominent men in the profession, and the clinics will be entirely new and varied, both in operative and mechanical dentistry.

The twenty-second annual meeting of the New Jersey State Dental Society will convene at Newark, N. J., on Wednesday, the 20th, at 10 A.M., for the transaction of society business only, going from there by special Pullman to Cresson.

Card orders for excursion tickets at reduced rates from all points in Pennsylvania and New Jersey can be had from Dr. Frank L. Bassett, 418 Girard Building, Philadelphia. Full programs will be mailed on application to

CHAS. A. MEEKER, D.D.S., *Cor. Sec'y for New Jersey*,
29 Fulton street, Newark, N. J.
H. NEWTON YOUNG, *Cor. Sec'y for Pennsylvania*,
Wilkes-Barre, Pa.

A cordial invitation is extended to those who have anything new in prosthetic dentistry, or who have acquired special skill in this very important branch, to be present at the union meeting at Cresson, Pa., July 20, 1892.

The committee will be present, and will endeavor to give those whose names may be received too late to be placed on the program an opportunity to demonstrate their methods.

J. A. LIBBEY,
W. F. LITCH,
HOWARD E. ROBERTS.

WISCONSIN STATE DENTAL SOCIETY.

THE twenty-second annual meeting of the Wisconsin State Dental Society will convene in Milwaukee, on Tuesday, July 19, 1892, and the sessions will be continued for three days.

A cordial invitation is extended to the dentists of Chicago and all others who may wish to be present. An interesting program may be expected.

CLAUDE A. SOUTHWELL, *Secretary*,
No. 411 National ave., Milwaukee, Wis.

MISSOURI STATE DENTAL ASSOCIATION.

THE twenty-eighth annual meeting of this association will be held at Clinton, Mo., commencing Tuesday, July 5, 1892, and continuing four days. A number of important papers will be read, and clinics will be given by prominent operators.

Members of the profession are cordially invited to be present.

WILLIAM CONRAD, *Cor. Sec'y*, St. Louis, Mo.

NEW JERSEY EXAMINATIONS.

THE next meeting of the New Jersey State Board of Examiners will be held at the Commission Rooms, No. 88 Broad street, Elizabeth, N. J., on Monday and Tuesday, July 18 and 19, 1892. Candidates will please file their applications with the secretary before July 5. Blanks and information furnished on application.

G. CARLETON BROWN, *Secretary*,
No. 88 Broad street, Elizabeth, N. J.

NORTHERN OHIO DENTAL ASSOCIATION.

THE next meeting of the Northern Ohio Dental Association will be held in Akron, O., the first Tuesday in May, 1893.

The newly elected officers are: W. H. Whitslar, Cleveland, president; S. B. Dewey, Cleveland, vice-president; H. Barnes, Cleveland, corresponding secretary; L. P. Bethel, Kent, recording secretary; Chas. Buffett, Cleveland, treasurer.

H. BARNES, *Cor. Secretary*,
106 Euclid ave., Cleveland, O.

NATIONAL ASSOCIATION OF DENTAL FACULTIES.

THE ninth annual meeting of the National Association of Dental Faculties will be held at Niagara Falls, N. Y., commencing on Monday, August 1, 1892, at 10 o'clock A.M.

Each delegate must be a member of the faculty of the school he represents, and be provided with the proper credentials.

W. H. EAMES, *President*.
J. D. PATTERSON, *Secretary*.

EDITORIAL.

THE ANNUAL MEETINGS.

IN a former editorial (DENTAL COSMOS, April, 1892) attention was called to the desirability of co-operation in dental society work, and some suggestions were there offered looking to a closer relationship and community of interest among the local dental organizations throughout the United States through the medium of their representation in the American Dental Association. The circular recently issued by the chairman of the Executive Committee, requesting reports from the various local organizations giving a record of their work of a scientific nature during the past year, is a practical effort toward this end, and one which should be promptly and fully complied with by all progressive dental organizations throughout the land. The intent of the request embodied in the circular letter of the chairman of the executive committee, as well as of the suggestions in our former editorial, is to enhance the value of the work of the American Dental Association by organizing the working forces in dental science and art throughout the United States upon a definite co-operative plan, to the end that the annual report shall be a condensed *résumé* of all that has been accomplished in the various departments of dentistry during the preceding year. The educational value of such a record cannot be easily overestimated, and would tend to the establishment of methods of practice on more uniform lines. A practical example of the utility and value of co-operation in dental scientific work is shown in the report of the correspondent of the Dental Society of the State of New York, which appears in the current number of the DENTAL COSMOS, p. 552. Certain queries were formulated with reference to the treatment of pulp-canals, and copies of these sent to a number of dental practitioners, with the request that they be carefully answered, in the light of the methods pursued and results obtained, by each one to whom the circular was addressed. The data thus collated form the basis of a report which gives in condensed form much valuable material within the range of the subjects included, and which cannot fail to be helpful to the individual practitioner in a study of this important field in operative dentistry. An extension of this method to the whole profession of the United States is what has been suggested and is now contemplated. It can readily be done if a closer union between the various local organizations is effected through the medium of the national organizations. Such a co-operative union can be best effected by increased representation of the local societies in the national bodies, and by so conducting the work in these latter that the dominant spirit shall tend to the promotion and production of scientific and educational work in dentistry, and not the professional aggrandizement of individuals by political methods.

The most hopeful outlook for the attainment of this object seems to be in the direction of greater emphasis to the Section work by means of the co-operative plan as noted, and the relegation of all ethical, political, and business matters to trustworthy committees. Dentistry has become so definitely specialized that in our national associations a division of the work, and a development of the strength of and interest in the Section work, becomes an organic necessity. Such a plan is in line with the growth tendency of dentistry toward specialization, and must bring about an increased interest in the work of the Sections among those who practice more or less exclusively in a given department. The efforts in this direction have heretofore fallen short of the best results, largely because no definite plan, general in its application, has been formulated and pursued with respect to securing material to form the basis of Section work. Under the influence of the arrangement suggested, the national association would in time, by the growth of its Sections, become a strong federation of sub-organizations engaged in special lines of dental work, and enable those in attendance to select for special attention the departments in which their greatest interest lay.

The approach of the time of meeting of our two governing dental bodies suggests the propriety of a personal consideration of the mutual relations of individual practitioners and these organizations. At no time perhaps have these relations merited greater consideration than at present. The various committees to whom have been intrusted the carrying out of the details of the World's Columbian Dental Congress will meet in connection with the American and Southern Dental Associations, and plans will be more fully perfected with the object of presenting at Chicago in 1893 the status of dentistry throughout the world. It would seem to be opportune at these meetings to make a vigorous and determined effort to revise the character and method of dental society work in the lines of national co-operative effort and closer relationship among our local organizations, to the end that more and better educational and scientific results may be attained, the individual interest of all progressive practitioners be secured, and that a showing may be made at the World's Columbian Dental Congress in 1893 which shall be fully in harmony with the prestige claimed for American dentistry. The unusual importance of these coming meetings should insure a full attendance, and every practitioner of dentistry in America should regard it as a professional obligation to, if possible, be present at either or both of them, and lend the weight of his influence toward the promotion of the higher interests and advancement of our calling along the lines indicated.

AMERICAN MEDICAL ASSOCIATION—FORTY-THIRD ANNUAL MEETING.

THE forty-third annual meeting of the American Medical Association was held at Detroit, Mich., June 7, 8, 9, and 10. This meeting was one of the largest and most interesting in the history of the association, the attendance being largely of those who are foremost in the various departments of medicine and surgery. The papers were many of them of unusual interest. The proceedings were marked by the high character of work done and the intense interest manifested by those in attendance upon the several Sections. The emphasis given to the Section work, together with the absence of political wrangling and wire-pulling, are features upon which the members of the association are to be congratulated. The relegation of all ethical questions, business matters, and nominations to special committees created for disposing of these, has done more than anything else toward placing this body upon a plane of increased usefulness in the production of scientific work of a high order, and it is only this that can bring about a large attendance and an enthusiastic interest in the proceedings. The work done by the Section in Dental and Oral Surgery was highly creditable, and an interesting series of papers were read. A full abstract of these, with the discussions thereon, will be published in succeeding numbers of the DENTAL COSMOS.

THE CENSUS CLASSIFICATION OF DENTISTS.

FOLLOWING is the full text of the bill introduced by Mr. Willcox, of Connecticut, as an amendment to the act which provides for the taking of the Eleventh Census of the United States. This amendment provides the penalties for a failure to comply with the requirements of the census act of March 1, 1889, under which act dentists were classified as manufacturers, or, as the amendment states, "individuals engaged in a productive industry."

The injustice of this classification has promptly called forth a protest from several of the state dental organizations, as well as in every instance where the attention of individual dentists has been called to it.

The Willcox bill was passed in the House of Representatives on Saturday, June 4, and will come before the Senate soon. It is the purpose of the several committees appointed by the different state and local societies to proceed to Washington and protest against the present classification, and endeavor to secure for dentists the classification formerly assigned to them under the census act of 1880,—viz : that of persons engaged in "selected occupations" under which lawyers, physicians, dentists, druggists, clergymen, etc., were classed together. It is not only desirable but necessary in this matter, which so seriously affects the professional status of every dental practitioner, that each individual member of the profession should give the weight of his personal influence toward averting this common injustice to and official degradation of our calling, to which end it is suggested that each member of the profession shall address the chairman of the Committee on Census Matters, Hon. Eugene Hale, U. S. Senate, Washington, D.C., personally protesting against the position in which the census authorities have placed us, and asking that we be excluded from the obligations and penalties of the Willcox bill.

A BILL amendatory of an act entitled "An act to provide for the taking of the Eleventh Census."

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That sections fifteen and seventeen of the act entitled "An act to provide for taking the eleventh and subsequent censuses," approved March first, eighteen hundred and eighty-nine, be, and the same are hereby, amended so that the Superintendent of Census shall be required to obtain from every incorporated and unincorporated company, firm, *association, or person engaged in any productive industry*, the information called for and specified in the general and special schedules heretofore approved *or to be hereafter approved by the Secretary of the Interior.* And every president, treasurer, secretary, agent, director, or other officer of every corporation engaged in such productive industry, and every person, firm, manager, or agent of unincorporated companies, and members of firms, *associations, or individuals likewise engaged in such productive industry*, from which or whom answers to any of the inquiries contained in the said schedules are herein required, who shall, if thereto requested by the Superintendent of Census, supervisor, enumerator, or special agent, or each or any of them, willfully neglect or refuse to give true and complete answers to any inquiry or inquiries contained in the said schedules, or shall willfully give false information in request thereto, shall be deemed guilty of a misdemeanor, and on conviction thereof shall be fined in a sum not exceeding ten thousand dollars, to which may be added imprisonment for a period not exceeding one year. And all acts or parts of acts in conflict herewith are hereby repealed.

ANONYMOUS CRITICISM.

WE gladly publish in this issue (p. 550) a communication from Mr. Andrew Wilson, L.D.S., of Edinburgh, whose letter in the January issue of the *Journal of the British Dental Association* called forth an anonymous comment signed "Cis-Atlantic," which appeared in the February number of the same journal. The character of the statements made by "Cis-Atlantic," in connection with their anonymous form of publication, manifested what seemed to us an unjust and detractive animus toward American dentistry, as expressed in the editorial on anonymous criticism in the May issue of the DENTAL COSMOS. The views there stated we still hold to be correct.

The *British Journal of Dental Science*, in its issue of June 1, after quoting the closing portion of the editorial in question, reminds us that instances of criticism nearer home are not wanting, which are not pleasanter though they are signed with the full name of the writers. With respect to this, we have to say that criticism of this character is in no way concerned in the discussion. The question at issue was anonymous criticism solely, and this we contended, and still do, is a method which is undignified and unfair; and when the anonymous method is used as a cover for such statements as those made by "Cis-Atlantic," it becomes cowardly, because of the evident attempt to shirk the responsibility for their utterance.

With regard to anonymous criticism along scientific lines, while the same argument applies, the personal element being absent it can never become an offense, though we cannot agree with the view expressed by our correspondent that a scientific statement anonymously made has the same value as one given by authority of a known individual, for the reason that, in the United States at least, the value of an observation is in most instances conditioned by the question of who makes it, and the value of the fact, as fact, is largely determined thereby. We confess that we had always heretofore believed that this was also true of such affairs among our brethren of Great Britain.

The *Journal of the British Dental Association* for June 15 devotes considerable space to an editorial "*résumé* and analysis of the *casus belli*," but in so doing falls into the error, as does Mr. Wilson, of making a much broader application of our criticism upon the letter of "Cis-Atlantic" than we intended should be made, and which we hope a more careful reading of the editorial in question will serve to correct. Moreover, the following allegation is attributed to us in the analysis by our contemporary as defining our views, viz: "It is alleged that by the publication, in the avowed form of a letter, of an anonymous communication, we render ourselves responsible for the sentiments therein contained." This is not warranted by the facts, inasmuch as it is not a quotation from the DENTAL COSMOS editorial nor does it contain the sense of the language therein used. What we do mean is what we did say, that "when views involving character or person, be they true or untrue, but having a detractive animus, are admitted [for publication], especially when these are anonymously published, the entire responsibility for the act rests upon the journal and its representatives."

It was our desire to present this matter in its ethical bearings, and the contention seems to us to involve a principle which is neither strange nor new, but one exactly analogous to that underlying the law which makes it an offense to utter libelous statement.

With regard to the general question of criticism, we heartily coincide with the position assumed by our contemporary, and we in common with many others of the dental profession of America deplore the lack of accurate scientific observation and the voluminous masses of verbiage with which we have to contend editorially and otherwise ; though we have never felt that these obstacles to professional progress were wholly monopolized by American dentistry. As a result we can truly sympathize with our contemporary, for we also do sometimes " have to print that which we do not consider to have any solid value."

But whether the letter of "Cis-Atlantic" is what we " elegantly styled an offensively sarcastic specimen of mud-throwing," or is " a labored joke in very bad taste," according to Mr. Wilson, we do feel that it was so lacking in everything but offensiveness that it should have been consigned to the waste-basket, or, if the communication was not considered " mischievous enough to bar it out," it would seem at least to have deserved the editorial " protest of some sort," unless mayhap the fact that " we sometimes have to print that which we do not consider to have any solid value" may account for its publication ; for certainly the writer's " strong claim to be heard" is not evident in his communication.

With respect to our May editorial, or our first contribution to the cause of amity in international professional relations, as it is styled by our contemporary, let us state that our suggestion to " exert a fostering care over all tendencies looking to a harmonization of international relations in dental professional matters" was only a suggestion, not even critical, while our conclusion which forms the " picturesque contrast" to this suggestion was merely a little criticism given in the true Darwinian spirit,—a spark of the " refining fire," so to speak, which escaped us, backed by the hope that it would help to strengthen the hands of those included within the limits of its proper application, and in this view would be welcome.

We trust that a more careful study of our position, as expressed in the editorial for May, will reveal the fact that our criticism was directed or at least was intended to be solely toward the kind of anonymous criticism of which the letter of " Cis-Atlantic" is an example ; and we distinctly disavow any intention of its more general application except as noted.

OBITUARY.

DR. JOHN ALLEN.

At the twenty-fourth annual meeting of the Dental Society of the State of New York, held at Albany, May 11 and 12, 1892, the following resolution was unanimously adopted :

" Whereas, This society has lost in the death of Dr. John Allen, of New York, one of its oldest and most worthy members, one who for nearly threescore years stood shoulder to shoulder with representative men in every laudable effort to promote the best interests of the dental profession, and who was recognized as the author of the highest art in one of our most important specialties; therefore,

"*Resolved*, That this society deeply mourns his loss, and desires to extend to his family its truest sympathy."

(Signed)
L. S. STRAW,
F. T. VAN WOERT,
O. E. HILL, *Committee.*

DR. JOHN W. EMERSON.

DIED, in Roxbury, Mass., at the residence of his brother-in-law, J. H. Thurlow, M.D., February 8, 1892, of typhoid fever, JOHN W. EMERSON, D.D.S., in the twenty-fifth year of his age.

Dr. Emerson graduated from the Boston Dental College, in the class of 1891, and was a member of the Alumni Association of that institution. He started in practice in Roxbury, and had been very successful up to the time of his decease.

The death of Dr. Emerson removes from the dental profession a man of much promise. He was unusually gifted, and was well known in Boston and vicinity as an excellent bass singer.

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A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

The abbreviations of titles used are those common to bibliographical work, and will, it is presumed, be readily comprehended by any one familiar with dental or scientific publications. Any explanation will be gladly furnished by the compiler. A star (*) indicates a Thesis.

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LIST OF UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING MAY, 1892.

May 3.—No. 474,011, to A. M. HARRISON. Dental tool.
" " No. 474,104, to J. J. STEDMAN. Artificial denture.
" " No. 474,131, to J. W. IVORY. Cervix clamp.
" " No. 474,132, to J. W. IVORY. Matrix retainer.
May 17.—No. 474,967, to JOSEPH PAYNE. Dental process.
" " No. 474,968, to JOSEPH PAYNE. Articulator.
" " No. 475,104, to J. H. BEEBEE. Flexible shafting and hanger.
" " No. 475,141, to D. B. MCHENRY. Dental plate.
May 24.—No. 475,382, to C. C. CARROLL. Dental amalgam.
May 31.—No. 475,928, to C. C. CARROLL. Vocal sounding board.
" " No. 476,088, to W. E. STILES. Flask.
" " No. 476,125, to E. A. BRYANT. Flask holder.

THE

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ORIGINAL COMMUNICATIONS.

A STUDY OF THE DEGENERACY OF THE JAWS OF THE HUMAN RACE.

BY EUGENE S. TALBOT, M.D., D.D.S., CHICAGO, ILL.

PROFESSOR OF DENTAL SURGERY, WOMAN'S MEDICAL COLLEGE, AND LECTURER ON DENTAL PATHOLOGY AND SURGERY, RUSH MEDICAL COLLEGE.

(Concluded from page 523.)

CONSTITUTIONAL LESIONS CAUSING AN ARREST OF DEVELOPMENT OF THE MAXILLÆ.

THE results of constitutional diseases are more marked in the osseous system than in any other part of the human body. Debilitating acute diseases (fevers, the exanthemata, etc.) in children are sometimes followed by sudden overgrowth of bone, which is quite noticeable. This process, affecting the jaw, may account for certain proportions of those cases of measles and pneumonia which are followed by dental irregularities and maxillary deformities.

In some cases, however, the process is a low grade of inflammation, which is followed by atrophy of the jaw, instead of hypertrophy or hyperplasia. The special predilection of these processes for the superior maxilla is on account of its liberal blood and lymphatic supply, and the contiguity of such cavities as the antrum and nasal fossæ, which, in many cases, contribute their quota of irritation.

The question of diathesis enters largely into the etiology of maxillary and dental deformities. The physical characteristics of strumous children demonstrate this fact quite forcibly. The description of this diathesis given by Fothergill is decidedly apt in this connection :

"This diathesis has an imperfectly developed osseous system as one of its characteristics. The bones are small, the shafts slender, the epiphyses enlarged, the hands are often unshapely from this osseous defect, the thorax is small, the forehead is high and prominent, the jaw is small, and the teeth crowded and carious."

Persons of a nervous diathesis have small jaws. Constitutional diseases, such as the exanthemata, syphilis, and phthisis, may affect the jaws in common with the other bony structures ; and as the teeth do not vary much in size in different subjects, a relatively small jaw results in such cases. Dr. Florence Hunt informs me that the majority of the Swedish and Norwegian patients of the Cook County Insane Asylum are affected with scrofula and other constitutional diseases, and that post-mortems reveal soft and undeveloped epiphyses not unlike cartilages. Writers on surgery have assigned as some of the causes of non-union of bones after fractures, the so-called scrofulous condition, the existence of any of the exanthemata, or the debility arising from them and syphilis.* The arrest of development of the entire organism following cerebro-spinal meningitis is well known to every one.

Pathologists have maintained that the regenerative process in all tissues is below par in constitutional diseases ; that is, that wounds do not heal so readily in a person the subject of constitutional disease. The development of tissue from an embryonal type to mature tissue is identical with the regenerative process† in the healing of wounds, or, as Senn‡ calls it, the vegetative process. Therefore the same causes that retard the one process must retard the other.

Following out the theory of Metschnikoff and his followers, we must conclude that the energy of the organism is expended in repelling the advances and barring the further progress of the micro-organisms that are the causes of these constitutional diseases. In consequence of this continuous warfare between the cells and microbes, the tissue-cells that are regenerated do not increase the size of the organ as in normal development. That these constitutional diseases do cause an arrest of development in children is well known to every observant parent. Sometimes this arrest of development will be permanent at the time of the disease, but more often the growth of the child is stopped for one or more years, and frequently development will not go on until the child is taken to another climate. The effect upon the jaws and teeth is very marked. Especially is this the case in the upper jaw. When arrest of development of the teeth takes place, pits and furrows are found upon the enamel. Every specialist of experience is able to determine by these pits and furrows the exact year when arrest of development took place. The well-known Hutchinson's teeth, familiar to every physician and dentist, are well-marked illustrations of arrest of development due to constitutional disease.

NEUROSES.

It is a singular fact that there seems to be a fascination for neurotic individuals to seek one another's society. Hence the large number of literary societies which are being formed throughout the country, entertainments and social gatherings at which brilliant men and women are to be found. These individuals not only seek one another's society, but marriages are the rule among them. There seems to be an irresistible force or liking one for the other. As a result of such marriages, children are born who, if they live, in many cases become geniuses or possess unbounded egotism. They may become idiotic, deaf and dumb, blind, or later in life insane, criminals, or drunkards.

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* Erichsen, "Science and Art of Surgery" ; Wyeth, "Surgery."

† Hamilton, "Pathology."

‡ Senn, "Principles of Surgery."

Dr. Bannister,* after citing several instances in which the degenerate intermarried, expresses the opinion that such marriages constitute a potent factor in the perpetuation of neuroses. Similar opinions are expressed by Dr. G. J. Kiernan,† who has also observed similar cases. He refers the degeneracy of genius to this factor. Genius attracts abnormal females, as light-houses do birds. Dr. Manning ‡ has found that the peculiar sympathy which the neurotics have for one another often results in marriage. The peculiarities of persons who visit their wives and husbands in insane hospitals are remarkable ; and it sometimes happens that the least demonstrably insane member of the family is under care, while the most demonstrably lunatic is at large. Nesbit, § from his studies on genius, draws the conclusion that neuropaths seem to be drawn to one another. The most remarkable illustration of this fondness of neurotics for one another is demonstrated in the Keeley Hospital at Dwight, Ill. Here are seen men of all professions, trades, and occupations, mingling together in the most social manner. It will also account for the large number of Bichloride-of-Gold Clubs which are being organized in different parts of the country. This sociability and affection are carried to the extent that in many cases cards are exchanged as tokens of remembrance, and also for the purpose of correspondence.

We have now observed the various influences which are brought to bear upon the present people of the world, producing excessive and arrested development of the osseous system and neuroses of the nervous system. Excessive and arrested development of the osseous system may be a direct inheritance, and the children will possess structures similar to those of one or both parents,—as, for instance, a child inherits an upper jaw from one parent and the lower jaw from the other parent ; or he may inherit the jaws from one parent and the teeth from the other ; or a neurotic brain may be transmitted to him, which presides over the development of the osseous system, and thus we get the excessive or arrested development of the jaw.

Abnormalities of the Jaws and Teeth due to Excessive Development.||

Fig. 8 illustrates excessive development of the upper maxilla. It is a characteristic representation of the Irish jaw. The lower jaw is normal in size, but owing to the excessively developed upper jaw there is a want of harmony in development, and hence the irregularity of the jaws and teeth. The individual has inherited the upper jaw of one parent and the lower jaw of the other parent. The rami are too short for the articulation when the second molars erupt. There is not sufficient space for them to come into position without the jaws opening in front,—a deformity frequently seen.

Fig. 9 illustrates the reverse condition, with different results. The patient has inherited a larger body of the lower jaw, but the rami are

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* *American Lancet*, vol. vii.

† *Neurological Review*, vol. i ; *Alienist and Neurologist*, vol. xiii.

‡ *Australian Medical Gazette*, 1885.

§ "Insanity of Genius," page 325.

|| These illustrations are taken from my work upon "Irregularities of the Teeth."

the same length as in the other case, the upper jaw being very weak, and the force of the lower jaw against the upper has carried the alveolar process and teeth forward, producing pouting of the lips and frequently a protrusion of the upper teeth. I have examined a large number of negro skulls in this country and in Europe, and I am of opinion that this peculiar condition constitutes the marked characteristic of the negro races. The larger lower jaw is a racial inheritance. The weak upper jaw is carried forward, owing to great force as applied by strong muscles.

FIG. 8.

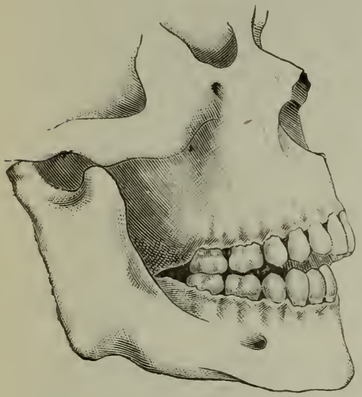


FIG. 9.

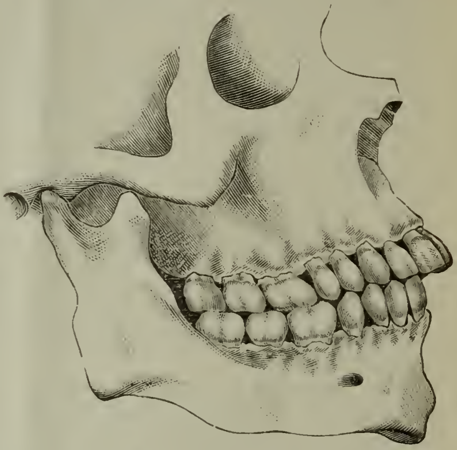


FIG. 10.

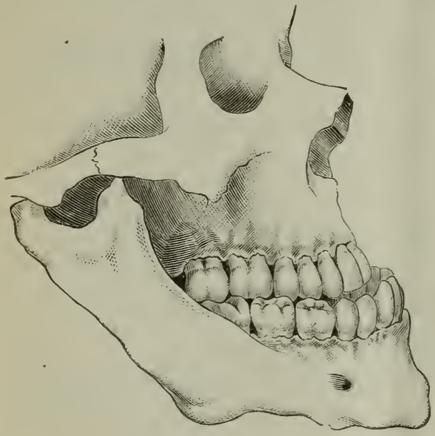


FIG. 11.

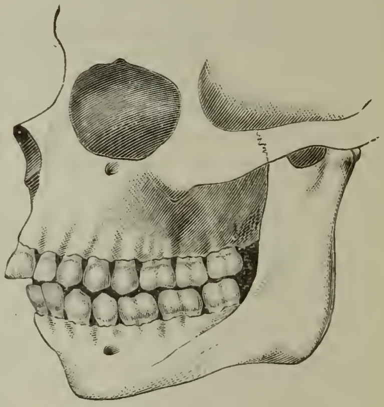


Fig. 10 illustrates a normal upper jaw and a normal body of the lower jaw. The individual has inherited long rami, which have carried the body and teeth forward, causing a very marked deformity by the protrusion of the chin.

Fig. 11 illustrates a deformity frequently observed upon the streets,—an arrest of development of the body of the lower jaw. These people possess a receding chin, and, in a case of marked arrest of development, no chin at all.

FIG. 12.

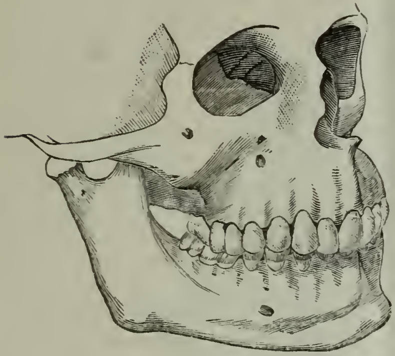


FIG. 13.

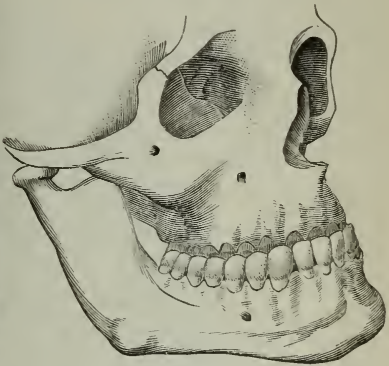


Fig. 12 illustrates a normal lower jaw, but the patient has inherited a larger upper jaw. All the anterior teeth shut over the lower teeth.

Fig. 13 illustrates a case just the reverse. The upper jaw is normal, but the patient has inherited a larger lower jaw. The teeth shut over the upper teeth.

FIG. 14.

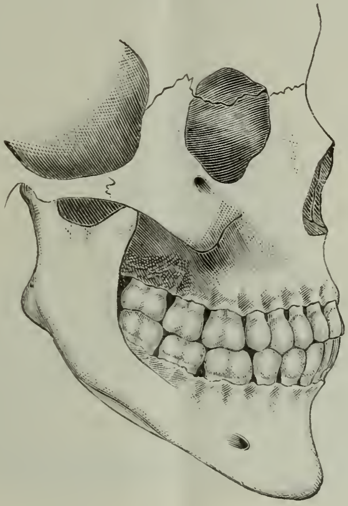


Fig. 14 illustrates a typical jaw of our native American women. Both jaws are normal. They are slender, and the bodies are large; the rami are very short.

RESULTS OF ARREST OF DEVELOPMENT OF THE JAWS.

By the accustomed eye arrest of development of the maxillæ is readily detected, both from external as well as internal observations.

In walking along the street, one is struck with the large number of individuals who present the following facial characteristics: The nose is pointed, flattened upon either side, the nasal cavities nearly if not quite closed, owing to the collapsed condition of the outer plate. The superior maxillary bone commences to slope gradually inward from the infraorbital foramen, until a point is reached in a line drawn from the anterior nasal spine to the lower lobe of the ear. This concavity extends backward as far as the malar process. I have frequently observed this peculiar condition among periodical drunkards. To such an extent does this exist in some cases that it becomes absolutely painful to talk with one thus afflicted, this being the usual expression of one who is suffering extreme pain or who has undergone a long illness. This deformity varies from a slight depression not noticeable to the unaccustomed eye, to the flattened face easily recognized by the tyro. While the facial expressions just mentioned are very common, a yet more noticeable external deformity is one where there is a marked depression at the alæ of the nose. If we will examine critically the faces of an audience in a church, theater, lecture-room, or public conveyance in Chicago, we will observe that from thirty-five to fifty per cent. of all the people present the peculiar facial characteristic mentioned above. Within the last six or eight years I have repeatedly made these observations, with the above-mentioned results. If, then, so large a percentage of arrest of development of the bones of the face is noticed among the citizens of Chicago, which is composed of people of one generation or two from all parts of the globe, how much larger percentage would we expect to find in the older cities of the country, such as those of New England and the Eastern states, where the present people are composed of individuals of the third and fourth generation, who have been subjected to all the discomforts and privations incident to city life for many years, as well as hereditary taint in all of its varieties? As some of the constitutional diseases and deformities are much more common among the people in older cities, we would naturally expect to find deformity or arrest of development of the bones of the face more common also. A closer inspection of the mouth, however, will reveal more marked results of the effects of the arrest of development of the superior maxillæ. If we will examine the skull of one of the pre-historic races or the mouth of one of the pure races, we will observe that the maxillary bones are larger, the teeth and alveolar process stand perpendicularly upon the jaw, and the teeth are perfectly even, as in Fig. 14. On the other hand, if we examine the jaw of an individual who possesses the above-mentioned deformity, we will see that the teeth and alveolar process in many cases seem to protrude. A closer inspection reveals the fact that there is arrest of development of the superior maxillary bone, and that the protrusion is a natural arrangement of the teeth and alveolar process.

In the study of deformities of the jaws with a view of ascertaining the causes of irregularities of the teeth, which I found to be arrest of development of the jaw, I collected three thousand models, and classified them according to their various forms. While there were no two jaws alike, yet the general outline of each group was the same.

By this plan I have been able to classify all the irregularities of the teeth that are due to constitutional causes or arrest of development of the jaw. These deformities of the teeth and jaw are easily divided into two great classes: first, the V-shaped arch, Fig. 15, where we observe the pinched condition at and anterior to the cuspids; second, the saddle-shaped arch, Fig. 16, where the pinched condition of the jaw is posterior to the cuspids.

FIG. 15.

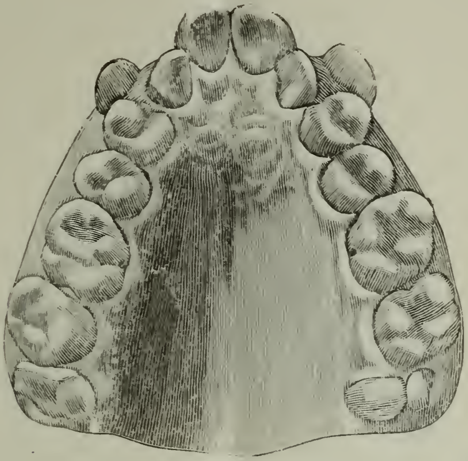
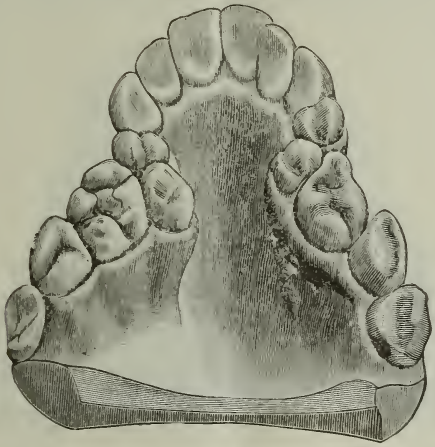


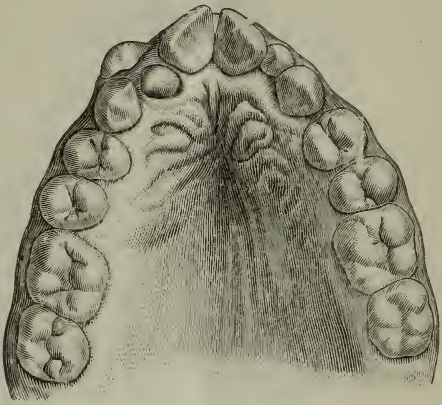
FIG. 16.



In the first variety, the alveolar process and teeth always protrude. In the second class they never protrude.

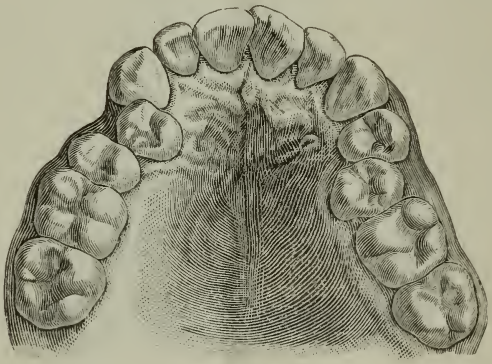
Other deformities are all modifications of these two varieties. Thus, in Fig. 17, we see a partial V which is neither a full arch nor a V shape. Fig. 18 shows a partial saddle, where the bicuspids are carried slightly inward. Fig. 19 shows a semi-V, where only one side is carried inward, and Fig. 20 shows a semi-saddle. Fig. 21 illustrates a blending of both varieties, a semi-V and semi-saddle on one side. The variety to be produced depends entirely upon the order of the development of the teeth.

Fig. 17.



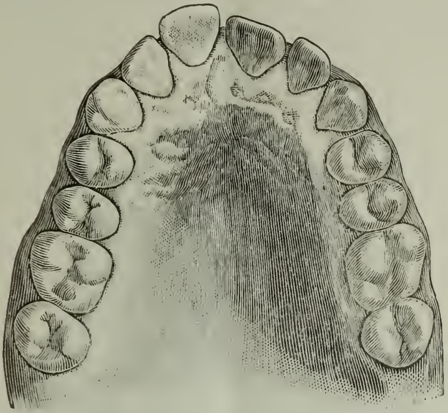
In the discussion of papers read by me in medical and dental societies, the argument has frequently been advanced that out of all of the conditions mentioned in this paper a new race would eventually be evolved, as distinct in form and appearance as any one of the European races.

Fig. 18.



My answer to these remarks is, "If by these changes normal jaws and teeth could be produced, no matter how small the jaw, we might expect a new type would be produced; but such normal development is out of the question, because, first, owing to the neurotic condition in which we are fast drifting, arrest of and excessive development of the jaws are becoming more common ; and second, the teeth are the same size to-day that they were three thousand years ago. They do not diminish in size in proportion to the jaws, hence irregularities of the teeth will become more numerous."

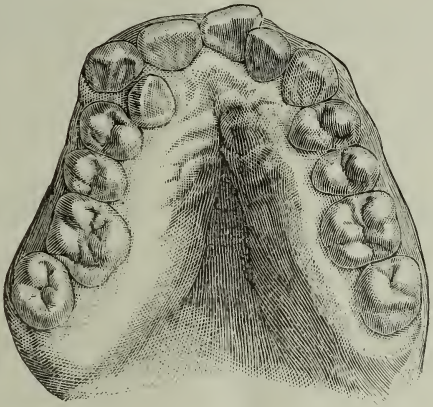
FIG. 19.



I cannot do better, in closing this article, than to quote E. Ray Lankester :*

"Degeneration may be defined as a gradual change of the structure in which the organism becomes adapted to less varied and less complex conditions of life ; while elaboration is a gradual change of structure in which the organism becomes adapted to more and more varied and complex conditions of existence. In elaboration there is a new expression of form, corresponding to new perfection of work in the animal machine ; in degeneration there is suppression of form,

FIG. 20.



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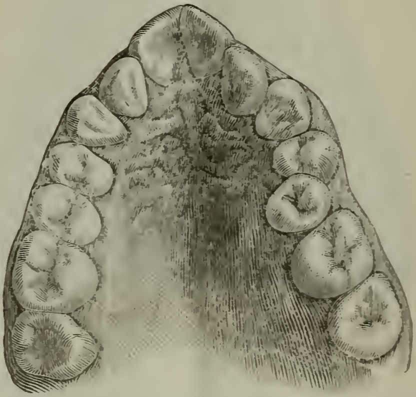
* "Degeneration," Humboldt Library.

corresponding to the cessation of work. Elaboration of some one organ may be a necessary accompaniment of degeneration in all the others; in fact, this is very generally the case; and it is only when the total result of the elaboration of some organs and the degeneration of others is such as to leave the whole animal in a lower condition—that is, fitted to less complex action and reaction in regard to its surroundings than was the ancestral form with which we are comparing it (either actually or in imagination)—that we speak of that animal as an instance of degeneration.

FIG. 21.



"Any new set of conditions occurring to an animal which render its food and safety very easily attained, seem to lead, as a rule, to degeneration; just as an active, healthy man sometimes degenerates when he becomes suddenly possessed of a fortune, or as Rome degenerated when possessed of the riches of the ancient world. The habit of parasitism clearly acts upon animal organization in this way. Let the parasitic life once be secured, and away go legs, jaws, eyes, and ears; the active, highly gifted crab, insect, or annelid may become a mere sac, absorbing nourishment and laying eggs."

SOME FEATURES OF THE HUMAN DENTAL ARTICULATION.

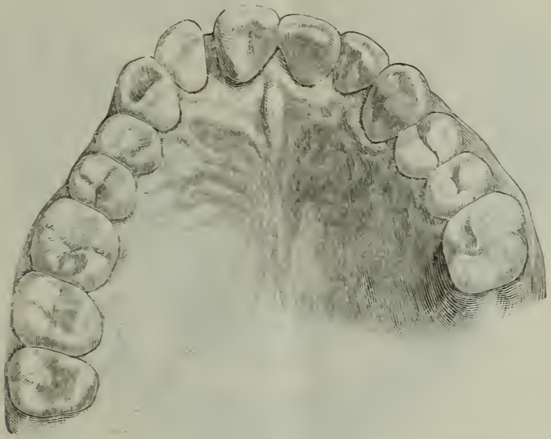
BY GILBERT S. DEAN, D.D.S., SAN FRANCISCO, CAL.

An address before the San Francisco Dental Association, February 8, 1892.)

A FEW days ago your president requested me to peruse a recent paper (read shortly since before the American Dental Society of Europe, and published last month in the *International Dental Journal*) from the pen of Dr. I. B. Davenport, of Paris, one of the ablest and most earnest men, let me say as a preliminary to again taking issue with him, in the dental profession. The paper related to the articulation, or, to be more exact, the interarticulation, of the teeth (that is, the articulation of the dentures with one another, as distinguished from the articulations of the teeth with the alveolar processes), a matter on which Dr. Davenport is regarded as authority, and for which, practically, he is as great a stickler as is Dr. Flagg for plastic fillings. At the same time, your worthy president stated that he had an interesting case of abrasion, the models of which he desired to present to you at your present meeting. And he wished me, as an antagonist of some of the former views of Dr. Davenport, and, it may be, as a probable antagonist of some of his own views, to read the paper and examine the models, with a view to a discussion for the edification of the society.

I, of course, complied with your president's request, being, as he said, "ready to do all in my power for the good of our profession." I found Dr. Davenport's paper, as was to be expected, positive in its statements, full in its conclusions, and fortified with a mass of clinical facts. The doctor's ideas I found in many respects unchanged—the same now as at the time of the publication of his former research into the human dental occlusion. But it seemed to me that he presented no matter calling for attention with regard to those doctrines which, five years ago, I considered most obstructive to progress, and, therefore, most strenuously opposed.

FIG. 1.

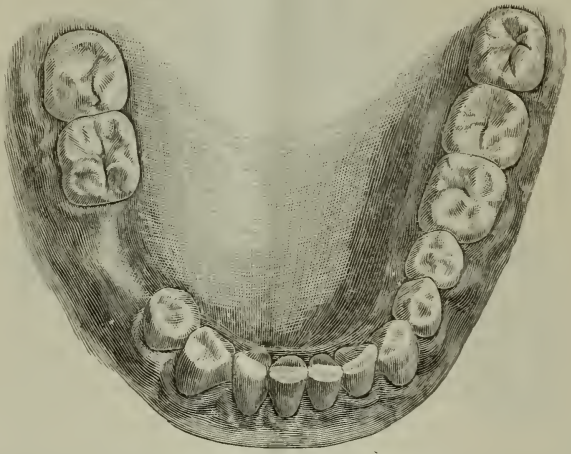


Turning to the models of the case which your president designed to present (Figs. 1 and 2), I found that they showed a difference between the two sides of the mouth in the matter of abrasion. There was abrasion on both sides ; all the teeth were abraded. But the loss of substance was greater on the side whence teeth had been removed,—if not absolutely, at least in effect. I agreed with your president in the belief that, if the missing teeth had been saved, there would have been, on this side, less noticeable wear.

Under these circumstances, I was not over-ready to be drawn into a "scientific fight." But, as controversy is one of the most valuable things in the world, both as awakening interest and as sharpening the intellect, it is desirable that we should quarrel. I will therefore say that Dr. Davenport, in his present paper, makes mistakes, some of which bear directly on prominent matters of practice. And I will endeavor to review (as the fittest apple of discord for this evening) those of these errors which your president's models and the presence of a gentleman with a wide reputation as authority on orthodontia tend to bring forward, namely: his doctrines concerning the effects of the interlocking of the dental cusps on tooth-movement on the one hand and on abrasion on the other. First, let me see if I can show more plainly, and, if I dare say it, more correctly, than Dr. Davenport has shown, the interlocking of these cusps in the normal human denture,—a somewhat audacious undertaking. Then let me make some statements, with a due presentation of clinical evidence, on the relations of this interlocking, first, to tooth-movement, and second, to abrasion.

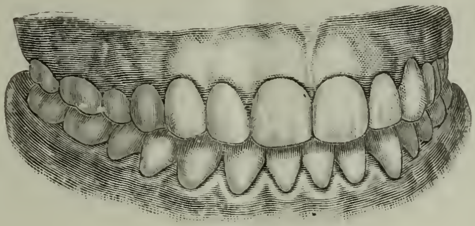
I have first to present certain anatomical facts of the interarticulation of the normal human denture. By "normal," let me say, for prevention of misunderstanding, I mean "perfect"—exactly as it ought to be, in order to meet our ideas of excellence. The *norma* was the square with which the ancient builder determined the exact lines to which a building should conform. The normal human denture, then, may have no real existence,—may have its being only in the mind of the dental artist. In real life, we must be content to approach it as nearly as we can. I present you, first, a model which I happen to have at hand (Fig. 3). Please do not injure it, as I have made it, not to illustrate this paper, but for the purpose of studying, with its help, some matters not in question this evening,—some questions as to shapes and arrangements of teeth. This model represents fairly well the normal denture of the modern or fragile type. It is not perfectly regular, but it is nearly so. It is the beautiful denture of a beautiful young lady. So perfect is the interarticulation of the teeth that no articulator is needed, nor is any study required to bring the models into relation. Place the models one upon the other, and they come together; they articulate themselves. The third molars have not appeared; probably never will; but, as regards all the other teeth, the denture is practically perfect.

FIG 2.



Let us look at this denture a moment before proceeding to controversy, in order to establish or refresh in our minds what I may call the pre-Davenportian facts of the articulation,—to obtain, that is, a basis for a discussion of secondary features. Note, first, that the upper teeth overlap the lower all round,—not merely the front teeth, but the bicuspids and molars as well. I do not mention this fact of the universal overlapping of the upper denture as an original observation ; I speak of it because, in the present connection, it is a first or basal truth which we need.

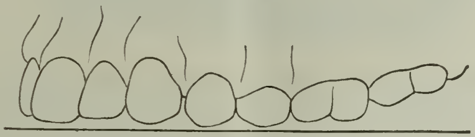
FIG. 3.



Note next that from the cuspids backward the upper teeth slant buccally, the lower lingually. In the case before us this inclination is perhaps exaggerated—greater than it should be. But I believe that, in a less degree, it is a feature of the normal denture.

If, now, you will invert the models, laying them on a plane, or if you will apply a straight-edge to them (Fig. 4), you will note another fact which, though not new, it is well to call to mind in this connection,—

FIG. 4.



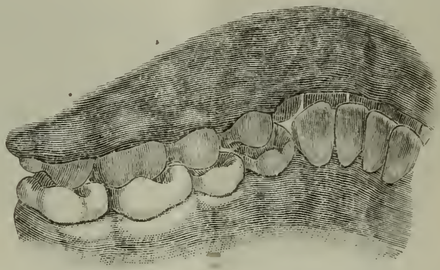
namely : that the "plane of articulation" is a curve. The occluding line, from the first bicuspid to the last molar, is a bow, with its back downward.

Placing, next, the models together, and looking in at the back, we see that, as the upper bicuspids and molars project outwardly beyond the lower, so the lower bicuspids and molars overlap the uppers inwardly,—the palatine cusps of the upper molars falling into depressions, or, to speak rudely but clearly, into the trough between the cusps, of the lower.

This brings us to Dr. Davenport's contention. He asserts that while the buccal cusps of the upper back teeth articulate between the buccal cusps of the lower, the palatine cusps fall upon the corresponding lower teeth, a cusp of each upper back tooth fitting into a cup or depression of each corresponding lower tooth (and *vice versa*). This alleged feature of the lingual aspect of the human denture (as to the buccal aspect we all agree) is the doctor's main point, the principal matter which he aims to show by his numerous illustrations and diagrams ; the great cause to which he refers the denture's usefulness and stability, and to whose absence he refers that denture's uselessness and instability.

Look at the internal aspect of our articulated model (Fig. 5), and see if the doctor's statement is true. (You can examine best with a mouth-mirror inserted from behind.) The inferior first bicuspid is a sort of stout cuspid, a tooth whose distal sulcus is so far below the buccal cusp that it cannot engage the palatine cusp of the upper first bicuspid, while its lingual cusp is so short that it does not touch the upper teeth at all. As regards the second bicuspids and the molars, Dr. Davenport's statement is true; there is a depression in the crown of the lower, into which fits a cusp of the upper. Notice, however, two things: First, the interlocking of the upper with the lower bicuspids is slight; second, the molars, which are the teeth in which the interlocking is greatest, engage one another only in pairs,—*i.e.*, do not extend, as Dr. Davenport says they should, the one over the other, in such a way that one molar interlocks with two in the opposite jaw. In a word, the special anatomical peculiarity of Dr. Davenport's ideal denture has, in our normal denture, scarcely more than a nominal existence.

Fig. 5.



Making at this point no allusion to dentures of other types, I pass to the relation of these features to our practice. First, as regards orthodontia. Dr. Davenport says, Do not disturb a good articulation unless you intend to give the patient another equally good,—according to Dr. Davenport's idea of goodness. The doctor's contention in this regard is, that if the bicuspids do not interlock according to his principle,—if they close, that is, between instead of upon one another, —they will wedge one another apart; and in general, that there must be Davenportian interlocking that there may be stability.

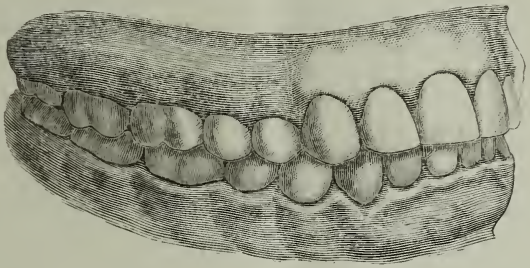
Please notice that this is purely a mechanical and clinical proposition. Dr. Davenport does not adhere to the hypothesis of a "divine idea" in the human denture, to which idea, of course, man must unquestioningly conform. We do not hear now, as we heard five years ago, the trumpeting of the band of nature-worshipers in praise of the perfection of "nature's handiwork." Dr. Davenport, and probably the entire Davenport school, is willing, to-day, to admit that nature does not make all things perfect. The contention now is not that we ought to throw the palatine cusp into the distal sulcus because this copies "nature's handiwork"; it is, on a rational basis, that we ought to do this, because the interlocking prevents displacement.

Is this doctrine correct? I assert that it is not. Some years ago, from the contention concerning the divine idea, I appealed to the facts. I now take a similar appeal from the rational contention.

First, I call your attention to the fact that Dr. Davenport's interlocking is not usually found in fine dentures. I present you now what I will call the normal Celtic denture (Fig. 6). You will notice that while in many respects this agrees with that which we have called the normal American, it has points of difference. One only of these here concerns us: the teeth do not interlock after Dr. Davenport's fashion.

I have here models of other dentures, made by other dentists because of the approach of the dentures to perfection, and in none of them (astonishing as the fact may seem) will you find Dr. Davenport's interlocking. This fact, of course, proves nothing as regards our duty. It may prove that nature has made mistakes in the conformation of human dentures in general, as she unquestionably has in that of the specimen of "nature's handiwork" which lies here before me, wherein the upper incisors stand outward like a fan. But couple this fact with two others, and it proves a great deal. The first of these others is the truth that these dentures, devoid of Dr. Davenport's interlocking, remain regular,—the teeth, in fact, not separating by interwedging, as Dr. Davenport imagines they must do, nor becoming in any other way irregular. The second is the clinical truth that, despite interlocking, one tooth of a pair may change its position. This second truth may be seen in the case presented by the president (Figs. 1 and 2). Here a lower second bicuspid and first molar of the right side have been extracted,—undoubtedly after the articulation was formed. Now, when I measure, with this card, the space between the first bicuspid and second molar of the opposite side at the cervix, and then, with the card, span the gap left by the removal of these teeth, I find that the teeth remaining on this right side have approached one another absolutely. If, now, I measure the corresponding spaces between the coronal angles on the two sides, I find a still greater approach of the teeth; I find that, in other words, the second molar of the crippled side has tipped forward. In this case extraction has been followed by less movement than usual; yet two distinct movements are plainly perceptible; and (what here concerns us) these movements have occurred in spite of restraining articulation with the teeth above.

FIG. 6.



Do not understand me as saying that articulation with other teeth has no effect—does not at all restrain movement. I merely say, and I believe these models prove, that he who too strongly emphasizes the restraining power of interarticulation is in error, as is, moreover, he who asserts a general tendency of teeth to go astray unless restrained by cross-interlocking. I am not wholly at variance with Dr. Davenport. I am not ready to assert that his cross-interlocking is absolutely without value in the matter of orthodontia. I quite agree with him that "when teeth are regular and well articulated they will ordinarily remain so," at least till diseases or vicissitudes of adult life change their inter-relations. But I believe, on the other hand, that in his estimate of the "forces and assistances" which determine the positions of the human teeth the doctor goes astray, thereby misleading his followers in important matters which relate directly to their daily practice.

Leaving orthodontia, I turn to abrasion. Here Dr. Davenport claims, as a preliminary, that the "harmonious adjustment of uneven surfaces secures the very highest masticatory functions," and, as the main proposition, that the "harmonious adjustment of uneven surfaces" is indefinitely maintained by uniformity of wear,—that, in his own words, the normal human denture is a "self-sharpening machine."

Before discussing these propositions, let us note that here, as before, the questions are purely mechanical and clinical. We have to inquire simply what we are to expect, mechanically, as results of certain movements of certain surfaces, and to see what in fact we find to be the results of these movements. And let us note further that Dr. Davenport's cross-interlocking of bicuspids and molars cuts no figure here ; whether the teeth bridge one another or not, the "complicated uneven surfaces" will grind food nearly and will wear precisely in the same way,—at least, the *onus probandi* lies heavily on him who should assert (as I do not understand Dr. Davenport to do) the contrary. What I understand Dr. Davenport to claim (certainly all which he can claim with any show of reason), is that, if the teeth interdigitate, instead of closing cusp to cusp, they will wear uniformly and therefore retain the forms of their articulating surfaces—in Dr. Davenport's language, "sharpen themselves."

Our questions being defined, we may proceed to consider them. Examining any of the model dentures shown here to-night, we will see that when in occlusion they so interlock as to prevent lateral motion of the jaws. Let us take, for an example, our normal American denture (Fig. 3). Articulating the models, I find that as long as they occlude, they resist efforts to move them laterally. They interlock so as to hold one another firmly. I now move the dentures laterally, as in the act of grinding, and you see that they ride on one another so that few points are in contact,—two or three cusps of the upper molars with two or three cusps of the lower molars on one side ; on the other side, all the buccal cusps, above and below, from the cuspid to the last molar, and perhaps a palatine cusp or two of the molars. The same will be found true of normal dentures generally. Here is our Celtic denture (Fig. 6). I will place it in the Bonwill articulator, which articulator gives to the models movements simulating those of the human jaws. I think that, articulated in this device, these models will prove more interesting than if simply held in the hand. You notice here, as in the other case, resistance to lateral movement as long as the jaws are closed, and, when lateral movement takes place, riding up of the teeth so that they come cusp to cusp,—a number of cusps coming into contact on one side, and only the cusps at the extreme rear coming into contact on the other. Thus, with every form of normal denture, lateral movement minimizes usefulness. If, instead of being thrown to one side, the lower jaw is thrust forward, there is, as you see, another minimization of contact-surface and consequently of grinding power.

I need not enter into further detail. A denture constructed and operating on the principles here shown is plainly not the best for grinding; it evidently does not, as Dr. Davenport asserts, "secure the very highest masticatory functions." No rational man would build a buhr-mill on the pattern of this denture; but he would (and does) build such mills on the pattern of some other dentures with which we are familiar. If to this Dr. Davenport replies that the normal human denture is not a buhr-mill, but a roller-mill with smooth or wavy rollers, I will not deny the statement; but I will say that, in my belief, first, the contact-surfaces of the dentures are, even when of Davenportian perfection, inefficient as rollers; and, second, the modern engineer would prefer buhr to roller surfaces for grinding, if those surfaces were actuated by the muscles of mastication.

The normal human denture, then, is not a good grinding apparatus. The human molars (that is, mill-teeth—grinders), in their normal form, scarcely deserve their name. They are not built like those of food-grinding animals. The human denture, in its front part a cutter, is, in its rear part, a crusher with a little grinding power. But, because of its incapacity for use, the normal human denture is (as far as wear is concerned) durable. Such a denture may, especially if all the food is cooked, outwear the other organs of its possessor.

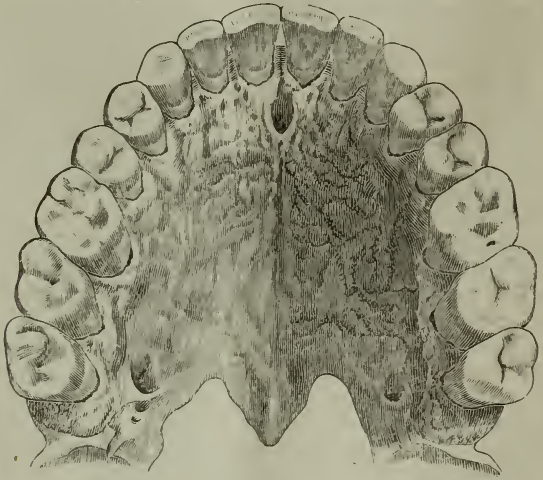
Let me here state, in a word, the belief to which I have been led by consideration of mechanical principles on the one hand, and observation of dentures, human and sub-human, on the other. There are, apart from continuous growth of the teeth (accompanied by non-closure of the apical foramina), but two ways in which durability of the mammalian denture may be secured. The first is by replacing the teeth as they wear out, exemplified in the elephant. The second is by exempting the teeth from use, exemplified, I believe, in modern man.

Enough has now been said to at least throw serious doubt on Dr. Davenport's position. But, as my proof is not absolute, and as the subject of abrasion has never been very fully discussed, a few further words may not be considered superfluous. To abbreviate these remarks, I will not discuss sub-human dentures, many of which become abraded (and some of which, I believe, are, like that of man, rendered useful, or at least increased in usefulness, by abrasion). I will speak only of the denture of man. Change somewhat the form of the human dentures shown here to-night. Instead of having deep sulci and long cusps, let the teeth composing the denture be relatively free from interlocking. The denture becomes better adapted for grinding, and, if used, will wear. Wherefore we find, I believe, as a clinical fact, that "square" teeth generally suffer more from abrasion than "long" teeth. We see this, as we see some other physiological truths, most markedly in sub-human life,—the square teeth of herbivores losing more substance through abrasion than the long or sharp teeth of carnivores.

I may add, as an etiological observation not wholly out of place, that, in my experience, with dentures of like conformation, women have been found comparatively exempt; men are the principal sufferers from abrasion. This, in connection with the further fact that strong men are especially liable, indicates (what we might anticipate) that muscularity is a potent cause of wear. To which remarks I may add a further in confirmation. If teeth are delicate in structure, their owners generally give them little work. The teeth which are used—not merely employed in cutting or mashing soft food, but actually ground upon, sometimes with food, more often with tobacco, frequently in rage, not seldom in sleep—are those which are hard. This has been the tenor of my observation, accompanied by the observations that soft teeth are generally possessed by delicate persons, and seldom lose much substance by abrasion ; abraded teeth are usually hard.

So much for the outlying facts of abrasion. I have mentioned them, believing it desirable that we should see them in this connection, because Dr. Davenport seems to hold that the etiology of abrasion lies wholly in the interarticulation of the teeth. Turn now to the forms assumed by the condition. Did anyone ever see, as a clinical fact, that whose existence Dr. Davenport asserts,—the presence of cusps on abraded teeth? Two forms of abrasion I have seen. These I will show you. A common fact found in both, a flat grinding-surface, will perhaps leave you, as it leaves me, convinced of the impossibility of what Dr. Davenport calls "self-sharpening."

FIG. 7.



I have here a human skull in which the teeth are abraded (Figs. 7, 8). As a grinder, this denture is now excellent ; it is almost as good as the abraded (the *really* self-sharpened) denture of a horse ; it evidently secures, as the normal human denture does not, "the very highest masticatory functions." Its peculiarity, you notice, is absence of the cusps ; its special peculiarity, as distinguished from the special peculiarity of the next case which I shall show, being absence of all of them. The cusps are all worn off.

Here is a mandible bearing another abraded denture (Fig. 9). In it, as in the other, cusps have been removed, leaving a flat surface ; but some of the cusps still remain. The general peculiarity, here as before,

FIG. 8.

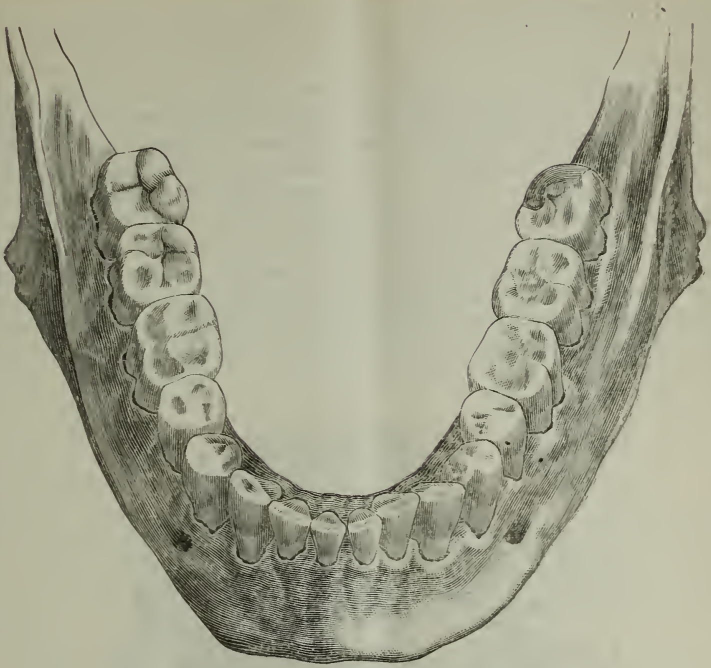
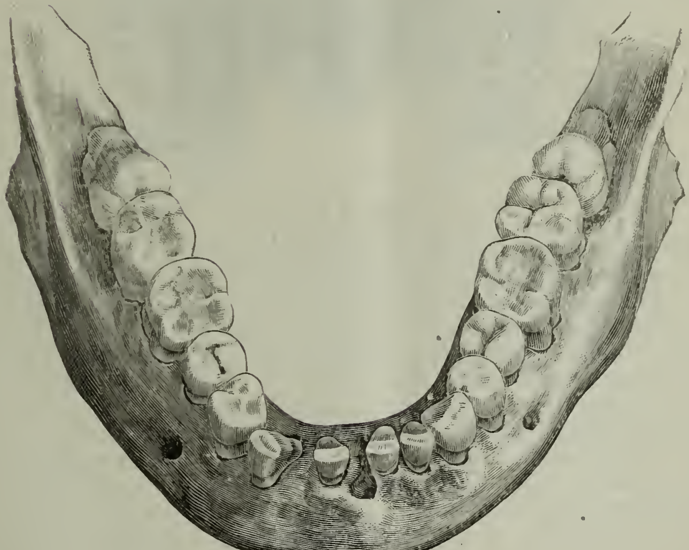
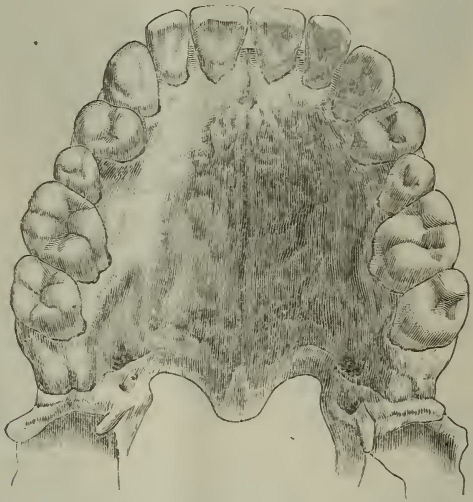


FIG. 9.



is absence of cusps. The special peculiarity is the presence of some cusps. Unlike that which we have just examined, this mandible exhibits pronounced lingual inclination of the molars, leading to obliteration of the buccal cusps only. This, I must tell you, is not a civilized bone. It is the skull of a Hawaiian of the past or savage age. It shows that abrasion of the teeth is not peculiar to civilized life. Indeed, as far as my observation has gone, I have found dental abrasion a phenomenon of rugged life, affecting mainly the uncivilized and the hardy among the civilized,—almost unknown among the delicate pets of civilization. There are other points pertaining to this mandible which, though they do not concern our subject, I must mention, for the reason that they will attract attention and excite discussion. The most conspicuous of these is the horizontal position of the third molars, they growing from the ramus instead of from the body of the jaw. We have been taught that errors like this are found only in civilization ; but, in fact, it is evident that the uncivilized are not exempt from evils attendant on eruption of the inferior *dentes sapientiæ.*

FIG. 10.



As a complement to this case of abrasion, that you may see the character of the young Hawaiian denture (which probably varied less than does that of our mixed races), it seems to me desirable to present this skull (Fig. 10), which shows an upper denture, unworn. This bone, like the other, belonged to a "child of nature," who died before the atmosphere of his country was tainted by civilization. The denture, like the other, you will observe, is beautifully regular and strong. You will notice that, like the other, it startlingly presents a feature which, we are told, is found only in the civilized, the peculiarity here being absence of the third molars ; reduction of the molars being here so much more marked than in civilized life that we have the second molars as small as our civilized wisdom-teeth. Indeed, reduction of the teeth has here gone so far that the second bicuspids are peg-like in size, an approach to edentulosity which I have never seen in the civilized jaw. One more matter will strike you forcibly as common to both these savage cases : this is the absence of dental caries ; the uncivilized teeth, though lodged, like the civilized, in jaws too small to accommodate the full thirty-two, and though deficient both in number and in size, are excellent in quality of material, and practically free from coronal fissures and buccal pits,—free, that is, from the actual structural *defects* of civilized teeth. What havoc a few such specimens would make among the doctrines in which we have been educated concerning dependence of dental caries on "frailty," due to reduction of the teeth by reason of disuse !

I beg your pardon for the digression. The special features presented by these cases are too salient to escape observation, and therefore needed comment. Now, returning to our subject, let me apologize for the introduction of savage skulls, to which you may object on the ground that the food of savages is often sandy and consequently unduly abrasive. These are the best specimens I can obtain at the moment ; and, called on for an instantaneous paper, I must be content with the best I can give you at short notice. And the error resulting from the introduction of savage skulls is probably slight ; it is quite certainly of degree rather than of kind. This being granted, I would call your attention pointedly to the two forms of abrasion shown. We have partial abrasion,—that is, loss of some cusps ; and we have total abrasion, or loss of all the cusps. These two forms of abrasion I have seen. But I have never seen anything approaching what Dr. Davenport calls "self-sharpening,"—that is, "wear uniformly distributed," retaining, as a result, the primitive form of the morsal surface of the denture.

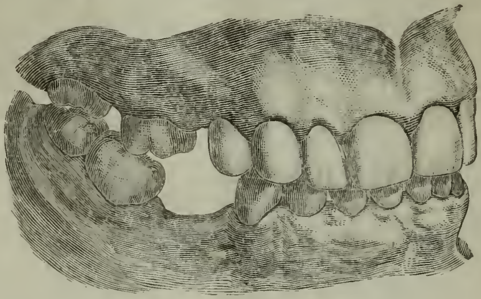
I cannot meet Dr. Davenport on this subject by presentation of that evidence which would be required for demonstration, namely : two models of the same denture, one showing its articulation in youth, the other showing its abrasion in age ; while simultaneously showing the relative utilities of the wavy and the flat surfaces for grinding. I have consequently been obliged to content myself with probable evidence. But I believe that I have now produced sufficient proof to fully overcome Dr. Davenport's bare assertion, unsupported by any evidence whatever.

Dr. Davenport may resent the assertion that he gives no evidence. But the fact remains. As to the statement that the normal human dental interarticulation secures the very highest masticatory functions, he simply takes the wish for the fact. He does, indeed, say that all the coronal surfaces of the posterior teeth slide upon one another ; but this, even if it were true, would not be adequate evidence, and it is not true. As to the other statement, that the normal human denture is "self-sharpening" (that is, equal everywhere in its abrasion), it is not less a longing of its author without a corresponding reality. The doctor does, indeed, present a case wherein, though the patient is advanced in life, the teeth have suffered little abrasion. We all have seen such cases, but, till now, never heard them called cases of self-sharpening. We must admire enthusiasts. The world would be badly off without them. We must not crush out those poetic fancies which are more valuable than truth. But we must require a recognition of guiding facts.

The practical corollaries of what we have seen, in the matters of improvement of natural dentures in utility, prevention of undue abrasion, and construction of artificial dentures in such manner as to secure the maximum of usefulness, though of such importance as to demand marked attention, are too manifest to need explicit statement. I need not occupy time in their detailed presentation. To prove the correctness of these practical corollaries, however, I had thought of presenting models showing crowns, bridges, artificial teeth, and partial natural dentures, which, as regards articulation, have been constructed or treated on the principles implied, and which are declared superior by intelligent possessors. But time forbids. And this practical showing, though it would be desirable, is not very necessary for those who have grasped the philosophy of the future,—for those, that is, who see, with open eyes, the truth that nature is to be, not copied, but surpassed.

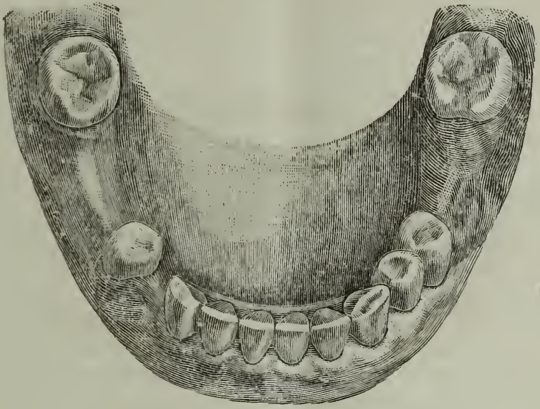
Having seen that Dr. Davenport does not illuminate the subject of abrasion, let us proceed to examine the case presented by the president (Figs. 1 and 2). Let us look at it first in a general way, in comparison with other cases, for the reason that we need for the discussion of this case some principles which, though they may be known to many, have never, I believe, been publicly announced. Looking at the models, which for convenience I will place in the articulator, we see that the teeth on the left side have suffered some abrasion, but that the amount is not very great, and that the wear is uniform. On the right side, from which have been removed the inferior second bicuspid and first molar, the abrasion of the molars is slight, but that of the cuspids and the bicuspids which antagonize is great. Here we come upon the first of the general principles just alluded to. We have seen that, in this case, the remaining lower molars have undergone, in a slight degree, a forward translation and rotation. If, however, no other change of position had followed the extraction, we should have had as much or more abrasion of the distal cusps or the disto-buccal cusp of the molars as of the remaining bicuspid and cuspid, which is not the fact. Has not, then, another movement occurred,—either the bicuspid risen or the molars become depressed? Let us, as a preliminary to endeavoring to answer this question, look at another mouth from which the same teeth have been lost. Here are models of such a mouth (Fig. 11). It is a case picked up at random,—that of a lady who came to me a day or two ago for treatment. The usual movements of the remaining lower molars have taken place, the re-

FIG. 11.



sult being, as usual, a defective articulation—crippling or destroying the usefulness of this side of the mouth. What, in this case, is the change, if any, in the height of the remaining lower molars and bicuspid? The bicuspid occludes fairly. There has been little alteration in its position. But the molars have moved greatly, and one feature of their movement is depression. The mesio-coronal angle of the second inferior molar is below its normal level. Whether the disto-coronal angle also suffered depression,—that is, whether every part of the tooth moved downward,—it is difficult to determine. But, in spite of elongation (extrusion) of the lower molar, due to lack of antagonism, the disto-corono-buccal angle (the highest point of a rotated inferior molar) appears not to be now above its pre-extractional level. This is, in my experience, a usual sequel of removal of the lower sixth-year molar; there occurs depression of the second molar as a whole, a single cusp usually (perhaps by reason of extrusion) remaining at approximately the normal level. Such being the general truth, it seems to me not improbable that in the case presented by the president the abrasion of the bicuspids is partially due to sinking of the molars, following removal of the missing teeth.

FIG. 12.



Another general truth needs now to be presented,—not because I hold it to be concerned in the case of the president, but because, after discussion, you may decide that it is concerned. The movements following extraction may occur in spite of considerable restraining forces. If the lower bicuspid, in the case presented by the president, tended to move, as a sequel to extraction, it might move in spite of the seemingly insurmountable resistance. In proof of which apparently irrational proposition I call your attention to this case of angular abrasion of the inferior third molars (Fig. 12). The first and second molars were extracted after maturity, the third molars being in place and presenting no abnormality. The result you see. The third molars have rotated forward, undeterred by a resistance so great as to have removed by abrasion the entire disto-coronal angle.

We may next, leaving generalities, look at the model presented by the president (Figs. 1, 2) as a case in practice,—a case on which we may, as the president desires that we should, hold a consultation. We have seen that in this mouth the lower back teeth of the right side have probably subsided, and certainly moved forward, as a sequel of the extraction of the molar and bicuspid. It appears, too, from the direct closure of bicuspid on bicuspid, as if the lower front teeth had moved backward on the side most affected, thus coming into more direct occlusion with the upper teeth. But this appearance is, perhaps, deceptive, for the following reasons: 1. Spontaneous backward movement of teeth posterior to the cuspids is not to be predicated without direct evidence. 2. There are no spaces between any of the front teeth, and the right cuspid and lateral incisor overlap almost as much as those of the other side. 3. The movement of the molars, which teeth are most subject to post-extractional movement, is small,—indicating fixity of the teeth in general, tendency to retain their positions. There is a point in favor of the hypothesis that movement of the front teeth has been a factor in the production of the great abrasion on the crippled side; this is the fact that, on this side, all the teeth from the cuspid back have an inward inclination, as if all had undergone an inward rotation. That the lower molars usually suffer inward (lingual) rotation as a result of extraction of teeth anterior to them, I believe to be the fact. This you see both in the case presented by the president (Figs. 1, 2), and in the case of removal of the same teeth to which I have just called your attention (Fig. 11). In these cases the inferior molars have not only moved forward and tipped forward; they have also, apparently, tipped or revolved inwardly, toward the tongue. But I have not usually noticed a corresponding movement on the part of teeth anterior to the molars. Perhaps there usually is an inward or lingual rotation of the inferior bicuspids and front teeth as a sequel of extraction of the molars, the movement being generally too small to attract marked attention. If there is a tendency to this rotation, the rotation might occur (Dr. Davenport to the contrary notwithstanding) in spite of perfect articulation of the bicuspids, and might occur even in spite of the resistance indicated by great abrasion of the rotated teeth, as in the case of angular abrasion which I have cited (Fig. 12). I should like to hear on this subject of front-tooth rotation from those whose experience has been wider than my own. Meanwhile, holding that the saddle-deformity which you perceive in the superior denture is ground for expectation of some tendency to abnormality in the inferior, and holding that further ground is furnished by the character of the abraded inferior bicuspid, which, while occupying the position of the first, simulates in appearance the second, I hold that there are, in this case, other causes than extraction sufficient to explain that position of the erring bicuspid which has apparently, to some extent, determined both the form and the amount of its abrasion.

I will now pass around the divers models and specimens which I have brought before you as illustrations, that you may examine them more minutely. I have, in addition to those which I have used, some models of fine dentures kindly furnished me by friends. I have also a number of models, handed me this afternoon by your president, showing results of extraction. All of these I hope you will critically inspect. They may show me to be wrong in the issues which I have taken with Dr. Davenport. Whether so or not, one thing they will certainly show, namely: that Dr. Davenport, however erroneous may be some of his conclusions, is correct in the statement that the most common irregularity of the human teeth is defective interarticulation. They will, moreover, I am sure, lead you to extend your thanks to the gentleman to whom we are indebted for the assertion and iteration of the principle that the articulation must be regarded in depth as well as surface,—that we should examine and carefully consider, in all cases, not merely the buccal, but also the lingual face of the occluded denture.

TRANSFORMISM.

BY C. N. PEIRCE, D.D.S., PHILADELPHIA, PA.

(Concluded from page 442.)

In the preceding papers it has been clearly indicated that in accepting the hypothesis of evolution or transformism we recognize that the earth, the heavenly bodies, the rocks, the soil, and indeed all inorganic as well as organic forms, have become what they are by a slow process, changing continuously, and in each modification looking toward a greater stability, and that this has been going on through a lapse of time so comparatively unlimited, that the mind of man is utterly unable to grasp or comprehend it. These organic forms must necessarily embrace all the various species of animals and plants which now exist, or ever have existed, not one of which is the result of any special creative act, but all have been developed in a natural manner, and in conformity with law, from previously existing groups, species, or conditions; the earliest antecedent or ancestor of the organisms being simple, single-celled, and homogeneous in structure, and these unicellular beings themselves at some remote period originating from inorganic or non-living matter. Through the ceaseless changing of external conditions (environments) these simple forms of living matter must have been modified, and through the law of transmission and heredity, these modifications being cumulative, must have been intensified and reproduced in the descendants; this form or method of development being recognized as in conformity with the theory of descent or transmutation, evolution or transformism.

Among the principal factors in this, which have already been enumerated, were and are the inherent or resident tendency to variation, and the survival of those varieties which were and are best adapted to the environment, those least so being suppressed. In pursuance of this there has been and now is acceleration in the development of the fittest, with retardation in the development of the unfit. Accepting this as a correct and philosophical statement regarding the ancestry and development of all organic forms, then the inevitable conclusion is that man himself, in conformity to the law, must have had for his remote ancestor a primordial organism, and in common with other animals has been by modification so developed; the traits, attributes, or peculiarities which belong to him as a genus having been produced through this same process of slow but continuous modification. In reciting the embryological history of man, we must make record of the fact that he, in common with other animals, is developed from an egg, which in its primordial condition is a simple, single-celled germ, and in the development of this germ a succession of organisms is formed which are wholly unlike the mature human body, bearing no resemblance to it whatever. In the earliest stage it cannot be distinguished from the incipient condition of a plant, and at the same time is closely allied to the protozoa; a little later the embryo would be a fair representative of the immature condition of any other vertebrate animal. (See diagram, page 621.) When, in progress of development, the vertebrate condition is determined, it is not possible from appearance to say whether its mature condition is to be a snake, a fish, or a bird; and as the mammalian peculiarities make their appearance, it is, with visual test only, doubtful whether it is to be a pig, a dog, a horse, or a man. At a certain stage, it will be seen by the diagram, the human embryo has gill-slits in the neck with arteries branching toward them, as in the fish, while subsequent stages represent successively the amphibian, the ornithorhynchus, marsupial, and ape. At a certain embryonic age, simian peculiarities present are marked by the great toe projecting laterally from the foot, also a tail longer than the legs, and hair all over the body, save palms of the hands and soles of the feet.

At last the peculiar human form is evolved as a final result, but not without the presence of various rudimentary structures or peculiarities which shall subsequently receive notice. Embryologically considered, then, there is certainly no valid reason for exempting man from an origin such as has been ascribed to the rest of the organic world; nor is it possible, as has been stated in a previous paper, to assign him physically, structurally, to a department, sub-kingdom, order, or family of his own, for he is as truly a member of the vertebrate sub-kingdom and of the order of primates as the lemur or monkey, and if comparison is to be made with these animals, he has bone for bone, muscle for muscle, and nerve for nerve; and however distasteful it may be to some to recognize the similarity and relationship, the chief distinction that can be given him is that he may have a genus of his own, the genus Homo, but so closely is he related anatomically to the anthropomorphic apes that the difference between him and these higher apes is less than between the apes and the ordinary monkeys (so says the paleontologist).

The theory of descent which has been so fully announced and sustained by Lamarck, Darwin, Haeckel, Cope, and a host of others, is to-day regarded as one of the most secure of biological laws, and for the reason that it is based on the facts of paleontology, on the succession and modification of species or groups of animals brought to light through the science of fossils. From the conditions under which these petrifactions have been found buried in the solidified or rock-layers of the earth, evidence substantial and satisfactory has been given that the population of the earth, vegetable as well as animal, together with the crust of the earth itself, has been slowly and gradually evolved, and as these different rock-layers have been brought into view and examined, they have exhibited a series of diverse beings which have successively appeared at different periods of the earth's history. In confirmation of this statement the following paragraph from Haeckel's "Evolution of Man" will be appropriate. "Modern geology shows us that the evolution of the earth has been gradual, and without total and violent revolutions." "Comparing the various plant and animal creations that have successively appeared during the earth's history, we find, in the first place, that an increase in the number of species has been constant and gradual from the earliest to the most recent times; and, in the second place, we perceive that the increase in the perfection of forms belonging to each of the larger groups of animals and plants is also constant." "For example, the only vertebrates existing in the earliest times are the lower fishes; then the higher kinds of fishes; later Amphibia appear; still later, the three higher classes of vertebrates. Reptiles first, then birds, and mammals; of these, only the most imperfect and lowest forms appear first; it is only at a very late period that the higher placental mammals appear, and among the latest and youngest forms of the latter is Man." "Both the perfection of forms and their variety originate, therefore, only gradually, and in a period extending from the oldest time to the present day." "This fact is of great importance, and can be explained only by the doctrine of descent, with which it perfectly agrees." "If the various groups of plants and animals really descended one from another, then such an increase in number and degree of perfection, as the series of fossils actually exhibits, must necessarily have occurred." The same author, with others, also attaches great importance to the facts contributed by comparative anatomy, "the science of forms." This compares the developed organic forms, and endeavors in their variety to find the one common law of their organization, or "general plan of structure." This study teaches that in the line of descent in the animal kingdom the inner structure of all animals belonging to one department or class—*e.g.*, Vertebrates, mammals especially—are in all important or essential points in a marked degree similar, and this is so even where the outward forms are extremely unlike. Man, for instance, being a mammal, is so closely allied in all the essential features of his internal organization to all other mammals that no comparative anatomist would for a moment doubt his connection with that class, and when comparison of structures and organs, as well as of their arrangement, is made with such animals as mice, rats, cats, dogs, horses, whales, bats, and monkeys, dissimilar in outward form as these are, the fundamental characteristics are so much alike that they must all be classed in the same order, though divided by more critical examination into different groups. This uniformity in essentials, notwithstanding great external dissimilarity, can only be explained intelligently through the aid of the 'Theory of Descent with Modification." The internal correspondence results from heredity and a common ancestor, and dissimilarity is in response to the law of adaptation to the varied conditions of life.

This brings us, in the line of evidence, to another feature of striking interest and of immense importance to the naturalist, as well as to the comparative anatomist, namely: the science of rudimentary organs. These are structures which in some ancestral forms were highly important, but have, in consequence of different environment and life-habit, become in man reduced to a rudimentary condition, being structures which are useless to the organism, valueless for its life purpose, and worthless for its function. Such organs are eminently variable and at times wholly absent, nevertheless liable to occasional reappearance through reversion. They are as follows: The muscles of the external ear, the scalp-muscles, and muscles of the skin, which are of important use to many mammals, giving them the power of erecting their ears to catch the sound-waves and of raising the crest or bristles of the head and shaking the skin. These in man are useless or unnecessary, hence largely functionless. The nictitating membrane, a small crescent-shaped fold of skin in the inner corner of the eye, highly developed and of great use in many vertebrates, is in man atrophied and utterly useless.

The vermiform appendix of the cæcum is the dangerous remnant of an organ useless in man, which frequently causes great suffering with fatal result. In many of our vegetable-eating ancestors it is much more fully developed and of great service in digestion. The sense of smell which civilized man possesses, as compared with the horse, the dog, or even the Indian (of whom it has been said "he could smell a white man a mile"), is certainly in a very feeble or rudimentary condition, with a suspicion that it is growing less keen in succeeding generations as the influences of civilization become more diffused or general. The coccyx of the human skeleton is but the atrophied representative of the tail of other mammals. The adult coccyx, says Dr. Osborn, contains but from three to five centers, while the embryo has from five to six. Testut records all the primitive tail muscles in various stages of reversion.

In connection with these examples of rudimentary organs may be given some illustrations of degeneration, variability, modification, and elimination through the adaptive process which is now going on,, taken from lectures by Henry Fairfield Osborn, Sc.D., on "The Contemporary Evolution of Man." Degeneration, he says, "is an extremely slow process ; both in the muscular and skeletal systems we find organs so far on the down grade that they are mere pensioners of the body, drawing pay (*i.e.*, nutrition) for past honorable services without performing any corresponding work,—the plantaris and palmaris muscles for example. Of course an organ without a function is a disadvantage, so that the final duty of degeneration is to restore the balance between structure and function, by placing it *hors de combat* entirely. One symptom of decline is variability, in which the organ seems to be demonstrating its own uselessness by occasional absence. The muscles which are most frequently absent by anomalies are in fact those which can disappear with least inconvenience, either because they can be replaced by others or because they play an altogether secondary *rôle* in the organism" (Humphrey). Of the skeletal variations, Professor Osborn notes the influence of posture on the form of the articular surfaces of the tibia and astragalus in the different races of man and the higher apes, also that the division of the neural spines in the upper cervical vertebræ distinguishes the higher races from the lower. He says the spine of the axis is always bifid, but the spines of the cervicals, three, four, and five, are also, as a rule, bifid in the European, while they are single in the lower races. Another important fact is that in most of the anthropoid apes there are thirteen complete ribs and four lumbar vertebræ, while man has twelve ribs and five lumbars; thus the superior lumbar of adult man is considered a ribless dorsal; but not so in the human embryo, for Rosenberg has found a cartilaginous rudiment of the missing thirteenth rib upon the so-called first lumbar.

In this same lecture Professor Osborn gives an interesting example of "correlated reversion" in stating that Birmingham reports, out of fifty cases examined in one year, two in which there were six lumbars, and in both the thirteenth rib was well developed. In speaking of skull-development, the increase in the size of the cranium and the late closure of the cranial sutures is in marked contrast with the more complete and earlier closure of the facial sutures. In this region the white and negro races present reversed conditions. The early closure and arrest of brain-development in the latter is well recognized, while in the former the later closure is given as an adaptation to brain-growth. Modifications are also noted in the arm toward the hand, showing an increased power of rotation in response to increased function. The modifications of the foot are of such interesting importance, the following paragraph is given verbatim :

"The foot is full of interest in its association of degeneration and development with our present habits of walking ; the great toe is increasing and the little toe diminishing, causing the oblique slope from within outward, which is in wide contrast with square toes in the infant or in the lower races. In many races the second toe is as long as the first, and the feet are carried parallel instead of the large toe turning out. If anyone will analyze his sensations in walking, even in his shoes, he will be conscious that the great toe is taking active part in progression, while the little toe is passive and insensitive. We are not surprised, therefore, to learn from Pfitzner that we are losing a phalanx, that in many human skeletons (41.5 per cent. in women and thirty-one per cent. in men) the two end joints of the little toe are fused. The fusion occurs not only in adults, but between birth and the seventh year, and in embryos of between the fifth and seventh month. The author does not attribute this to the mechanical pressure of tight shoes, because it is found in the poorer classes. He considers it the first act of a total degeneration of the fifth toe."

The evolution of the muscles of the foot is in the same direction. These modifications indicate, in this author's judgment, that the bones of the foot are developing on the inner and degenerating on the outer side, with loss of the lateral movements of the hallux, and of all independent movements in the little toe. The associated habit is that the main axis of pressure and strain now connects the heel and great toe, leaving the outer side of the foot comparatively functionless.

The modifications of the human hand are not less conspicuous than those of the foot. "On comparing it with that of the anthropoids, it may be seen that its efficiency is produced in two ways,—first, increasing the motility and variety of action of the thumb and fingers ; second, reducing the muscles used mainly to assist prolonged grasp, they being no longer necessary to an organ for delicate work requiring constant readjustment." The grasping power of infants is noted as being so great that the reflex contraction of the fingers upon a slender cross-bar sustains their weight ; this power and the decided inward rotation of the sole of the foot and mobility of the toes are *persistent* adaptations.

The diminishing or degeneracy of the lower jaw and teeth can readily be attributed to and explained by disuse. Mr. F. Howard Collins finds that, relatively to the skull, the mass of the recent English jaw is one-ninth less than that of the ancient British, and thinks that it is well established that the jaw is diminishing. With reference to the teeth, under size or diminution in size with the civilized races marks the molars as a whole. The third molar or wisdom-tooth, in the same class of persons, from its variability in size, form, durability, position, and uncertain date of appearance, indicates that it is certainly in process of elimination. These symptoms of decline are of course not recognized in the lower and savage races, for here the third molar is as large as the first or second, and erupted much earlier in life than with the civilized peoples.

On a careful inspection of a large collection of skulls, the contrast between the molars of the ancient and savage and the more recent and civilized is conspicuous. Professor Osborn says, upon the descent theory the reduction of teeth in the progenitor of man began as far back as the Eocene period, for not later than that remote age do we find the full complement of three incisors and four premolars in each jaw ; now there are but two remaining of each. Every dentist of long practice can recall cases where these missing teeth occur by reversion, and though this is to such a remote period it is well sustained by the number of mouths in which are found three incisors, and though the additional premolars (bicuspids) are not of as frequent occurrence, yet sufficient to state that the reversion does occur, the frequent appearance of supernumerary teeth attesting the fact. That the degeneracy or reduction in size of jaw is in advance of tooth-modification is well supported by the frequent necessity the dentist finds for extracting one or more teeth on each side of the mouth to give room for position of the remaining ones.

In Professor Osborn's summary of characters conspicuous in evolution, he mentions skull and jaw, spinal curvatures, cervicals, lumbars, and coccyx ; lower ribs, scapula, and lower humerus ; outer side of foot ; teeth ; flexors and extensors of arms ; shoulder to trunk ; trunk to femur. These he says are the several regions in the human body in which the evolution is relatively the most rapid. These regions especially are centers of adaptation to new habits of life, in which new organs and new relations of parts are being acquired, and old organs abandoned. Further, all parts of the body are not equally variable, but these centers of evolution are also the chief centers of variability. They arise from the constant struggle between adaptation and the force of heredity.

We turn now to the consideration of "rudimentary organs," examples of which have been given. They are absolutely functionless, and for their presence there can be no intelligent explanation, unless that at some time, and in some related animal, they have previously been organs not only of value, but essential to the life-habit of the animal. To emphasize this fact, take as an illustration the rudimentary legs of the boa constrictor (allusion to which was made in a letter to the editor in the March DENTAL COSMOS), which do not protrude through the skin, but which were essential to the movements and protection of some ancestral animal. These structures are all without the slightest doubt homologous with similar well-developed structures, and functional in other animals, but they are of no use to their possessors, hence they become variable in size and appearance. They must eventually be eliminated, unless some protracted change of environment rendering them necessary should overtake the animal in which they are now as rudiments, when it is possible they may again be stimulated into organs of function, but only through this same process by which they have been aborted, *i.e.*, survival of the fittest. The theory of descent with modification (transformism) is the only intelligent explanation.

The critic may query as to the difference between "aborted organs" and "nascent organs." The answer the evolutionist or transformist must give is, that the former are actual remnants of organs which were functional and essential at one time in the history of the ancestors of the animals now possessing them as rudiments, but which, on account of some change in the environment and necessitated habits, became no longer useful, consequently by disuse gradually became smaller and smaller until they were finally reduced to simple rudiments or were eliminated. "Nascent organs" are such as those adhering to the belief in special creation are pleased to call "prophetic organs." They are organs, however, which, very simple in structure, in low animals serve them a life or protective purpose, and foreshadow the more complex homologous organs in higher animals. Professor H. W. Conn, in his "Evolution of To-Day," gives as an excellent example the air-bladder of fishes. This is valuable for a hydrostatic apparatus; but it occurs in such relations as to show that it is the undoubted homologue of the lungs of land animals. Occurring in animals not highly organized and where lungs have never been present in the ancestors, it cannot be regarded as the aborted remnant of a previously functional lung, but rather as a beginning, a new organ capable of further development, just as every organ, according to the descent theory, must make its appearance as a very simple structure, which gradually develops, generation after generation, and in course of time becomes perfected. There is, finally, this difference between an atrophied organ and a nascent one: the former is functionless, while the latter has some function, though it be a very different one from that possessed by its well-developed homologue.

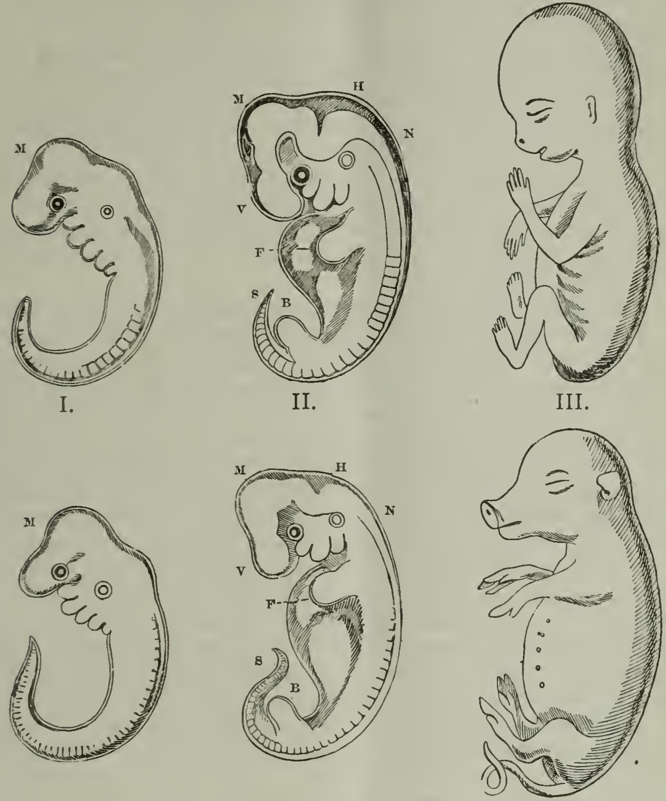
The evidence given in the foregoing pages of rudimentary organs and of structures which have been and are now undergoing modification, must certainly be accepted as unanswerable arguments in favor of the hypothesis which has already been more than once intimated, if not positively asserted, that man is the descendant of some preexisting generic type, which, if now living, would probably possess arboreal habits and be classed with the apes. Professor Huxley has already been quoted to the effect that the structural differences between man and the chimpanzee are much less than those between the chimpanzee and lower Quadrumana, as lemurs, etc. In fact, Professor Cope says, man is the type of a family, Hominidæ, of the order Quadrumana, as indicated by the characters of the dentition, extremities, brain, etc. Geoffrey St. Hilaire informs us he found from his dissections, made as early as 1856, the brain of man is nearer in structure to that of the orang than the orang's is to that of the South American howler, and the orang and howler are more nearly related in this regard than are the howler and the marmoset.

From "The Origin of the Fittest," by E. D. Cope, we learn that modifications presented by man have resulted from an acceleration in development in some respects, and retardation in others, but until the combination which is now characteristic of the genus Homo was attained, the being could not properly be called man. It must also be remembered that as any organic type is characterized by the presence of a number of peculiarities which have been developed independently of each other, its distinctive features and striking functions are not exhibited until that co-existence is attained which is necessary for these ends. It follows, then, as a natural sequence, that as the characters of the human genus were probably developed successively, but few of the distinctive indications of human superiority appeared until the combination was accomplished. These instances are given which well illustrate this idea: Let the opposable thumb be first perfected, of what use would it be in human affairs without a mind to direct? And of what use a mind without speech to unlock it? And speech could not be possible, though all the muscles of the larynx but one were developed, or but a slight abnormal convexity in one pair of cartilages remained.

To the objection which has frequently been urged, that there have as yet been found no remains of ape-like men, Professor Cope responds, that this has but little weight, for frequently the paleontologist has bridged greater gaps than this, and greater remain which he expects to fill; but while races of men are still existing which exhibit various ape-like characters, little force can be attached to such criticisms. The existence of higher and lower races is fully admitted. In these latter are found many peculiarities which show a greater or less approximation to the apes. The following peculiar structural characters belonging to the negro in his most typical form are of that kind, and however great may be the distance of his removal therefrom, they tell the story in indisputable language. The flattening of the nose, the prolongation of the jaws, the deficiency of the calf of the leg, the length of the arm, the tread on the outside of the foot, and the obliquity of the pelvis, which approaches more the horizontal position than it does in the Caucasian, all constitute such resemblances or approximations. The investigations made at Washington during the war having reference to the physical characteristics of the soldiers, demonstrated that the arms of the negro are from one to two inches longer than those of the whites. The conclusion to be drawn from these facts is, that while this, the negro race, is a species of the genus Homo, in character he is as distinct from the Caucasian as are the differences we are accustomed to recognize in other departments of the animal kingdom, but, as Professor Cope says, he is not distinct by isolation, since intermediate forms can be abundantly found.

In an examination of the physiognomies of infants of the Indo-European race, characters which are prominent in the Negro race at maturity have their representative in this immature condition; for instance, the flattened bridge of the nose and shortened nasal cartilages are not less prominent or conspicuous than the deficient calf. That is, in the higher races there are conditions belonging to the immature stages of life, while in the lower race they retain this condition at maturity as a condition normal to the type. These undeveloped characters persist later in some races than in others, modified by their ancestral history. If we take the Greek nose with its elevated bridge as a type of esthetic beauty and developmental perfection, then the greatest deviation from this would the more nearly approximate that condition common to the lower race.

A peculiarity in development which has been mentioned by Professor Cope and others, which illustrates the influence of country and climate, as well as probable inheritance, is that the orang possesses the peculiarly developed malar bones and the copper color characteristic of the Mongolian inhabitants of the regions in which this animal is found, while the gorilla exhibits the prognathic jaws and black hue of the African races near whom he dwells. This kind of geographical imitation is noted as being quite common in the animal kingdom.



The above diagrams are taken from a series in Haeckel's "Evolution of Man," vol. i, page 362, and are intended by that author to represent the more or less complete agreement, as regards the most important relations of form, between the embryo of man and that of other vertebrates in early stages of individual development. This agreement is more complete, the earlier the period at which the human embryo is compared with those of other vertebrates, and is retained longer, the more nearly related in descent the respective matured animals are. The figures show the embryos of two mammals in the three corresponding stages,—of a hog and a man. The first or left-hand figures (I) represent a very early stage, with gill-openings, and without limbs. The second figures from the left show a somewhat later stage, with the first rudiments of limbs, while the gill-openings are yet retained. The third figures (III) to the right show a still later stage, with the limbs more developed and the gill-openings lost. To facilitate the comparison, they are reduced to nearly the same size in the cuts. The embryos are seen from the left side; the head extremity is above, the tail extremity below, the arched back is turned to the right. The letters indicate the same parts in both series: *v*, fore-brain: *m*, mid-brain; *h*, hind-brain; *n*, after-brain; *f*, fore-limbs; *b*, hind-limbs; *s*, tail. These diagrams or cuts illustrate very fully the statement of Professor Huxley, that man has no peculiar organism of his own; that he does not originate in a different way from a dog, bird, frog, or hog, but that he does develop from a similar embryo and undergo the same slow and gradual progressive modifications. His origin and the earlier stages of his development are undoubtedly identical with those of the animals standing directly below him in the scale; and no less in embryonic development than in anatomical structure man closely resembles the higher mammals, and especially the apes. There seems little reason to longer doubt the common descent of man and the other mammals from a single primeval parent-form, or hesitate to believe that the blood-relationship is closest between man and apes.

In conclusion, the foregoing has been written with special reference to revealing as far as possible within the limits of a few short papers some of the vital processes which are involved in the doctrine or hypothesis of evolution or transformism, and to illustrate, if possible, the unity prevailing in a long series of phenomena which links civilized to savage man, and savage man to an ancestral line which, running through a vast, yes, almost unlimited, series of animals, growing, in a receding ratio, less and less complex, until unicellular organisms are reached; and these again as we grow more and more distant from the present time have their beginnings lost in the inorganic matter of a primitive earth-crust, while this in turn must look for its origin to an antecedent sphere, glowing with incandescence so intense that its representative is but a cloud of clashing meteors. In all this marvelous transition and these wonderful phenomena, no claim can be made, nor is any attempted, as to the incipient origin of these manifestations of an unlimited and incomprehensible Power. All that is vouchsafed to do is to indicate the path in which this resident invisible force is working, and to point out the monuments builded by the way. Limitation of space and time is utterly unthinkable; while the indestructibility of matter, the continuity of motion, and the persistence of force, are factors in the theory of evolution as essential as a recognition of energy itself.

ON THE BUCCAL AND DENTAL INFECTIOUS MANIFESTATIONS OF INFLUENZA DURING THE EPIDEMICS OF 1889-90 AND 1891-92.

BY ARTHUR C. HUGENSCHMIDT, M.D., D.D.S., PARIS, FRANCE.

DURING the epidemic of 1889–90, one has not only observed the classical forms of this infectious disease, namely, the pulmonary, gastro-intestinal, or nervous forms, but also special localizations of this infection.

In France, Huchard* has called attention to a cardiac form, which he called cardiac influenza.

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* Huchard, Paris Hospitals Medical Society Reports, Jan. 24, 1890.

Galezowski,* Landolt,† have described a variety of ocular troubles, such as conjunctivitis, œdema of the eyelids, photophobia, keratitis, abscess of the eyelids, etc.

Loewenberg‡ and Politzer have met with auricular lesions which they have not hesitated, and for reason, to ascribe to influenza.

Comby,§ out of two hundred and eighteen children suffering from influenza, met with fourteen ocular complications and thirteen auricular localizations.

In fact, during the course of former epidemics, one had already noted special troubles. For instance, during the epidemic of influenza of 1789 in the United States,|| it had been noticed that the eyes were affected with œdema of the lids, itching of the lids, ophthalmia, etc. The ears were often involved with mastoidal complications. The nose was the seat of a very irritating discharge which brought on granular sores around the nose and mouth. The sense of taste disappeared from several patients. Dental swellings and neuralgia of same origin were common.

During the epidemic of 1739 in England, John Huxham,¶ from Plymouth, frequently observed ulcerations and swellings of the tonsils.

James Wilson,** from Philadelphia, also mentions the following localizations : herpes labialis, pharyngitis with tickling and difficulty in swallowing ; parotitis and salivation ; aphthous inflammation of the mouth.

Gubler,†† in France, says, "It is not rare to see in patients suffering from influenza, and having pneumonia or at least some fever, small aphthous ulcerations disseminated around the tongue or on the internal surface of the cheek, while more numerous groups accompanied with a more intense inflammatory display exist on the lips as well as on the borders of the palate."

The buccal cavity and dental organs have not been neglected during the epidemic of 1889-90, and that of 1891–92. As soon as the disease appeared in December, 1889, Dr. Bucquoy ‡‡ indicated at the Academy of Medicine of Paris, that among the symptoms observed on several children he had found a redness on the borders of the soft palate, which the next day extended all over the same region.

Comby§§ also observed in children erythematous pharyngitis and herpes labialis.

Villard,|||| from Marseilles, has seen inflammation of the soft palate, tonsils, pharynx, with or without a false membrane.

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*Charcot and Bouchard, "Treatise of Medicine," vol. i, 1891. Paris. P. 825.

†Landolt, *Semaine Medicale*, 1890, p. 17.

‡Loewenberg, *Bulletin Medicale*, Jan. 8, 1890.

§Comby, Paris Hospitals Medical Society Reports, Feb. 7, 1890.

||*Medical News*, Philadelphia, p. 138, 1892.

¶Huxham, "Observations on the Air and Epidemical Diseases." Translated from the Latin. London, 1758.

**Wilson, Pepper's "System of Medicine." T. i, p. 866. Philadelphia, 1885.

††Gubler, Art. "Bouche," "D're Encyclopédique des Sciences Medicales de Dechambre." T. x, p. 237.

‡‡Paris Academy of Medicine, Dec. 17, 1890.

§§Comby, Paris Hospitals Medical Society, Feb. 7, 1890.

||||Villard, "Clinical Lectures on Influenza," Paris, G. Masson, 1890.

Widal* has met with a buccal confluent eruption of aphthous ulcerations of influenza origin.

We have † called attention to certain varieties of buccal and dental inflammations occurring during the course of this disease.

Leyden, at the Medical Society of Berlin, indicated as special manifestations of influenza, anginæ, pharyngitis, and stomatitis.

Ewald, at the same society, presented the history of a physician whom he had treated for influenza complications, and who had a trigeminal neuralgia with abscess of the maxillary sinus, and who finally died from purulent meningitis of the base of the brain.

Trigeminal neuralgias during the course of these epidemics have been very frequent. Gaucher, from Paris; Nothnagel, from Vienna, and others, have met with such cases.

Lecaudey and Dubois‡ have met a certain number of simple inflammations of the gums, with or without ulcerations.

R. G. Richter,§ in the United States, has described simple acute inflammation of the gums, trigeminal neuralgia, and alveolar abscess during the convalescence of influenza.

As I already stated, I have also encountered during these last two epidemics of grippe, buccal and dental lesions which are not observed by us in our specialty ordinarily.

In a certain number of cases, these buccal or dental manifestations, or both combined, constitute, with the general symptoms of the infection, the only apparent localizations of influenza. In other persons, they occur as complications during the course of a pulmonary, gastro-intestinal, or nervous influenza. Finally, they are met with during the convalescence of the disease.

These manifestations and complications are of different varieties.

1. I have met with an ulcerous stomatitis of influenza origin, ulcerous inflammation extending throughout the buccal cavity and presenting special characters, which belong to no other lesion of the buccal cavity.

The only diseases which, at first sight, could be mistaken for it are: 1. On the first and second days a special appearance and localization which resembles the symptoms of the beginning of diphtheria. 2. On the third or fourth day one would be more apt to attribute it to one of those special secondary manifestations of syphilis, where somewhat extensive ulcerations are covered by a diphtheroid exudate, of such forms as were described by Albert Robin and Mauriac.

This infectious stomatitis recalls, not through its general manifestations, but more through its local appearances, those ulcerations of the throat, those ulcerous anginæ observed by Duguet, Desnos, etc., at the beginning of typhoid fever, before the appearance of any other symptoms,—ulcerous lesions which could well indicate the point of entrance of the typhoidal bacillus in those particular cases; in fact, the presence of Eberth's bacillus has been clearly demonstrated by Chautemesse in certain ulcerations of the beginning of typhoid fever, localized in the throat.

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* Widal, Art. "Grippe." Charcot and Bouchard, "Treatise of Medicine," vol. i.

† Hugenschmidt. Charcot and Bouchard, "Treatise of Medicine," p. 823, vol. i, August, 1891.

‡ Lecaudey and Dubois, *Odontologie*, Paris, February, 1890.

§ R. G. Richter, DENTAL COSMOS, November, 1891.

Is it not the same with buccal ulcerations occurring during influenza, and would the bacillus of Pfeiffer, Babes, not find in certain common lesions or erosions of the buccal cavity a point of entrance, a place for inoculation, to infect from this point the whole human organism?

That grippal infection can take place through the digestive organs seems to be demonstrated by the facts of Olivier and others, recalled by Widal. Yet although these facts are connected with animals only, they are not less interesting. A woman suffering from influenza rejected on her plate pieces of meat which she had sucked; her cat, who swallowed several pieces, died from influenza several days later. Another cat, suffering from influenza, with nasal secretion, contaminated other cats who partook of her meal.

The beginning of influenza stomatitis, or the symptoms of invasion of the disease, have been those of influenza. The patient in excellent health is suddenly taken, say in the evening, or middle of the night, by severe headache, lumbago, generally tired feeling, and very high fever. The next morning the teeth and gums are more or less sore. The disease begins.

I shall give two histories of cases which have come under my personal care, the patients presenting lesions which I have never observed before that epidemic.

Case I.—On December 10, 1889, a young man, aged twenty-seven, came home on a Friday at eleven P.M., feeling perfectly well; one member of his family was suffering from influenza bronchitis. He went to sleep quietly, and at three A.M. was suddenly awakened by a severe headache, pain in his limbs, and specially in the lumbar region, with very high fever. He then took thirty grains of antipyrine, and an hour later two glasses of Hunyadi Janos water.

The following morning, Saturday, he felt much better, and went to his occupation as usual, but he remarked, on making his toilet, that he could not brush his teeth, his gums being excessively painful and red. He had no appetite at lunch; took nothing. At two o'clock headache began again, as well as the lumbar pain, which became very severe and obliged him to return home.

His temperature at six P.M. being 40°1 C., he complained, besides lumbar pain and headache, of a sore throat. The gums were very red, the teeth very painful to the touch, especially the antero-inferior teeth; the tonsils, uvula, and soft palate were of a bright red, while the glands were involved.

The following day, on Sunday, the patient having had a very bad night, the swelling of the glands was very marked and painful to pressure. An examination of the mouth showed the gums to be very red. On the right tonsil there existed an ulceration about three mm. in long diameter, and one mm. broad, covered by a false membrane of a lemon-yellowish color, which, when removed, left a raw surface; moreover, at the right internal surface of the palate, immediately above the collar of the first and second bicuspids, there existed a very irregular ulceration, of about three mm. in diameter; the other regions of the mouth were also very red, the temperature 38°7 C.; the headache and lumbago persisted.

Sunday evening, temperature was 39°8 C.; three irregular ulcerations existed on the right tonsil, and two on the left tonsil; also one at the base of the uvula; the first ulceration which appeared on the tonsil had not increased, while that of the palate had greatly increased, and was double in size; we found, in addition, seven ulcerations on the soft and hard palate, and one at the neck of the left lower cuspid.

On Monday morning, temperature 38°4 C.; the ulcerations had extended all over the mouth, the gums were covered with them; the tonsils, palate, internal region of the cheeks, were involved; the ulceration of the palate had reached the size of a ten-cent piece, and continued to increase for two days after that until Wednesday, when it attained its maximum dimension,—the size of a twenty-five-cent piece,—and this notwithstanding cauterizing with carbolic acid. Not one ulceration presented a regular geometrical form.

On Monday evening the temperature reached 39°9 C.; the patient felt better from his lumbar pain, and complained only of his tongue, which had become very painful, very red, and increased in volume; the ganglionic swelling was very much developed, the ulcerations were innumerable, the internal surfaces of both upper and lower lips were involved, while the teeth were excessively sensitive from alveolar periostitis.

On Tuesday morning the temperature had gone down to 38°7 C.; the tongue presented here and there a certain number of regular, circular ulcerations presenting the aphthous type, but not one irregular; no other change in the other ulcerations. Those which had united together, and particularly those of the soft palate, were covered by a false membrane.

On Tuesday evening the temperature was 39°2 C. I counted thirty-eight aphthous ulcerations on the tongue, and I remarked that on the rest of the buccal mucous membranes which had not been involved by the irregular ulcerations a few circular, regular ulcerations had devolved.

On Wednesday morning, temperature was 38°1 C. The ulcerations had not involved new regions, and remained stationary; the patient was much better, and in the evening the temperature was only 38°2 C. From that moment on the patient passed into convalescence, but it was only one month after the beginning of the disease that the mouth returned to its normal state, leaving for several months, however, the patient in a state of general depression, while the large ulceration of the palate also left for a long time quite a depression of the mucous membrane.

Case II.—January 21, 1890, a young woman, aged thirty, who for several days had not been feeling very well, felt pain in the extremities, dull headache, febrile movement in the evening. Two persons of the same family were under treatment for pulmonary influenza.

Six days after the beginning of this malaise, she was suddenly taken one Tuesday evening by a very violent headache, high fever, the temperature being 39°6 C.; lumbar pains so intense that she could not remain on her feet.

The following day, Wednesday, the patient complained of her throat, and of a special sensibility of the gums and teeth of the two maxillaries, but especially of the lower teeth; the throat presented a diffused redness of the tonsils and uvula. In the evening, on the two tonsils and base of the uvula four ulcerations of an irregular, star-like form appeared; the gums were swollen, of a violet tint, the teeth very sore to the touch, the sub-maxillary ganglia were very developed and formed an enormous mass, as in the first instance, very similar to that observed in diphtheritic patients.

On Thursday morning the patient complained greatly of the sub-maxillary engorgement, which was very painful, and also the lumbar pain, while, on the other hand, the headache had become less acute than on the preceding days. The pillars of the pharynx, the tonsils, soft palate, and uvula were covered with irregular ulcerations, while the gums had begun to ulcerate at the neck of the teeth. Some of the ulcerations of the tonsils and soft palate, which had united, were covered with false membrane ; the breath had become very fetid.

On Friday morning the lips presented irregular ulcerations ; the tongue was swollen and painful, the breath fetid. In the evening the tongue was covered with eleven aphthæ, or ulcerations of that type, while some of the same form were found in the buccal cavity.

The next day the fever had disappeared, and the lesions had ceased to extend ; the infectious agent was then probably used up, as the ulcerations of the gums and pharynx, the glandular engorgement, all gradually diminished, but still it was only on the twenty-second day that the last ulceration disappeared.

In these two cases no tartar was present, the patients keeping their mouths very clean, while all the wisdom-teeth had erupted.

It is to be remarked that as soon as the aphthæ appeared in both of these cases, the patients became convalescent.

During the epidemic of 1890, besides the two cases above mentioned, I met in my practice seven cases of aphthous stomatitis more or less developed. Three cases occurred in one family ; the mother, suffering from the pulmonary form of influenza, got a light attack of aphthous stomatitis. Two daughters, aged respectively seven and nine years, were taken several days later by some general symptoms and an aphthous buccal eruption.

In other patients ulcerations began on the gums. The day after an attack of influenza the patient complained of hypersensibility of his teeth and gums ; he was incapable of brushing his teeth, on account of the pain produced. The *antero-inferior teeth* were specially sensitive, and the teeth of this region have always been more sensitive than those in other regions of the mouth.

Compared with other regions of the mouth, the antero-inferior region is the one which is continuously bathed by saliva. Could there not be in suspension in the salivary liquid some toxic products, toxines, and could the salivary glands not be called upon to eliminate the toxic products developed in the organism suffering from grippal infection, elimination which would explain the localization of this irritation observed in all cases where the buccal cavity is involved?

If one could demonstrate that the saliva is really a medium of elimination of the toxines, the origin of those obscure cases of gastro-intestinal influenza occurring four or five days after the disease has begun, in the lungs, for example, would be easily explained.

The patient afflicted with this localization of the disease cannot eat, for the least pressure on the sensitive teeth will bring on pain ; moreover, the teeth—seat of the pain—move very much.

On examination of the mouth, we find a red, violet gum festoon ; the gums are swollen and teeth movable ; if we strike on this morsal surface with the handle of an excavator, we find the teeth very painful, which indicates that the periosteum or dental ligament is involved. From twelve to twenty-four hours later there appear one or more ulcerations, more often situated at the collar of the tooth, at the junction of the tooth with the gum ; these ulcerations are liable to unite and involve the whole height of the gums, then extend into the buccal cavity, palate, lips, cheeks, and stop at the pillars of the pharynx. I must say that I have never seen more than eight ulcerations disseminated in the mouth, when the disease has begun at the gums, while when it started at the tonsils the number of ulcerations was considerable. Beginning at the gums, the lesions are much less extensive and serious than when starting on the tonsils. Another interesting fact is that, while we know that in diphtheria the disease has always a tendency to go from the mouth toward the pharynx and larynx, in influenza we note that when the disease begins in the mouth it remains localized there, and if beginning on the tonsils, the lesions come forward, instead of, as in diphtheria, going backward and downward. The most common form of buccal manifestations is simple gingivitis without ulcerations ; the gums are swollen, very red, and accompanied by alveolar periostitis ; the teeth are sore to percussion and mastication. It appears usually the day after the first attack of grippe, lasts three or four days, and is often accompanied by neuralgia of the maxillary branches of the fifth nerve.

Neuralgias of the fifth nerve, without special localized points, have also been very frequent ; the patient one moment points to a tooth, the next to another, as being the probable origin of the trouble, and yet on careful examination we find no dental pathological lesion. The pain being very variable, jumping from one of the branches of the fifth nerve to the other, not even excepting the ophthalmic branch, the lesion, if a lesion exists, belongs to the species neuritis, or inflammation of the sheath of the nerve.

If there are any devitalized teeth in the mouth, these will act as points of lesser resistance of the organism, and the infectious process will .concentrate itself upon them ; there will be an alveolo-dental periostitis and dental abscess. Such dental abscesses have been very common in gripped persons.

In a young lady who had had an influenza pneumonia and who had four dead teeth badly treated in different parts of her mouth, I saw four different abscesses develop at the same time.

In rheumatismal and gouty patients, influenza has left for a long time after its passage a great sensibility of the necks of the teeth to the touch.

During this winter's epidemic the first cases I met with were simple inflammations of the gum, with generalized dental periostitis. The first case I saw this winter was on November 22.

On December 12 I saw a person suffering from very marked ulcerations of the gums, accompanied by stomatitis. This is the only ulcerous case observed this winter. Neuralgia of the fifth nerve and grippal gingivitis have often been accompanied by alveolar troubles, especially conjunctivitis and auricular troubles, otitis.

In a young lady aged sixteen an intense neuralgia of the fifth nerve, having its maximum point of intensity at an upper first right molar, kept up for three days, when one morning it had completely disappeared. The same evening she was suffering very strongly from her ear, where a suppuration of the middle ear ensued, which terminated on the fourth day by perforation of the membranum tympani.

During December, 1891, in regular practice, I met with five persons presenting accidents of evolution of the wisdom-teeth. Two of them had been gripped, two of them had gripped persons around them, while the fifth could not say or recollect having met a gripped person. These facts, where I am convinced infection played a great part, sustain the opinion advanced by Dr. Galippe, that the accidents of eruption of the wisdom-teeth are due not only to mechanical obstacles which prevent their eruption, but also to infectious parasites coming from outside.

Simple and phlegmonous tonsillitis, more or less developed, has also been observed very often by general practitioners.

In a word, we have met with: 1. A special kind of infectious ulcerous stomatitis due to influenza. 2. Ulcerous or simple gingivitis, accompanied by dental generalized periostitis. 3. Suppurating alveolo-dental periostitis. 4. Neuralgia of the fifth nerve. 5. Accidents of evolution of the wisdom-teeth.

As local treatment, nothing special. Antiseptic mouth-washes, thymol, boric acid solution.

Application on the gums of the following preparation:

Salol, 6 grammes;
Liquid vaseline, 40 grammes. M.
Sig.—External use.

Liquid alimentation. Against pain, the following mixture painted over the gums:

Menthol, 3 grammes;
Chloroform, 5 grammes. M.

DENTAL EROSION AND THE GOUTY DIATHESIS: ARE THEY USUALLY ASSOCIATED?

BY EDWIN T. DARBY, M.D., D.D.S., PHILADELPHIA, PA.

(Read before the annual meeting of the Dental Society of the State of New York, May 11, 1892.)

MR. PRESIDENT AND GENTLEMEN:

In the consideration of the subject of dental erosion, I am not unmindful of the fact that it is one which has been enshrouded in darkness, and even at the present day but little light has been evolved as to its etiology.

The following paragraph from the pen of Dr. Black may in a measure excuse me for offering a paper upon this subject at this time. He says,—

"The etiology of erosion is probably one of the most obscure subjects in pathology. With our present knowledge, it is practically unexplainable. This being the case, it seems incumbent upon every writer who treats of the subject to give any facts in his possession that may seem to have significance, in the hope that, from the accumulation of data, something tangible may be derived in the future."

The earlier writers of text-books have either passed the subject in silence, or have devoted but little space to its consideration. Whenever it has been treated of, there seems to have been a want of harmony as to its nomenclature, for it has been denominated chemical abrasion, decay of denudation, dry caries, and finally (the name which seems most satisfactory) erosion. It may not be amiss to review in brief outline some of the theories which have been advanced to account for this peculiar condition which at the present day is eliciting so much interest in dental practice.

Accordingly, let us go back to Hunter, who believed it to be a disease inherent in the tooth, and in nowise dependent upon circumstances in after-life.

Fox thought the cause was to be looked for in the saliva and the friction of the lips.

Bell believed that it was to be accounted for by mechanical causes, but suggests the thought that imperfections in the formation of the enamel had much to do with it.

Harris held to the belief that an acidulated buccal mucus was the exciting cause.

Taft inclines to the theory that an acidulated buccal mucus is instrumental in producing erosion, and thinks that constitutional treatment may have a beneficial effect in controlling the disease.

Sir John Tomes holds to the theory that it is the result of mechanical influences, and that all cases can be traced to the action of the tooth-brush.

Mr. Chas. S. Tomes does not fully coincide with the views promulgated by his father, for in a revision of his work he gives examples of a similar condition to be found upon the teeth of those who seldom used a tooth-brush, and cites the observation of Dr. Muree, who had noticed similar wastings upon the teeth of a sea-lion, and that the places most affected were those least exposed to mechanical influences.

Dr. Garretson seems quite undecided as to a theory, but is inclined to attribute it to electrolytic action.

Dr. G. V. Black, who has devoted much space to the subject in the "American System of Dentistry," and who has apparently considered it from almost every standpoint, expresses some doubt as to its real cause, but inclines to the belief that it is largely an acid condition, dependent upon some modifying influences as yet unknown to us.

Dr. James Truman has for many years maintained that it is the result of an acid condition consequent upon fermentation taking place in the mouth, more especially during the night, or when the mouth is in repose, and corroborates this theory by tests with litmus paper, which almost invariably shows an acid reaction upon rising in the morning, or after a fast of several hours' duration.

Dr. Edward C. Kirk maintains that erosion is to be accounted for by the solvent action of the product of the mucous glands located in the buccal mucous membrane.

With a view of obtaining the opinions of a large number of eminent men in our profession, the writer has recently addressed to each a letter of inquiry, soliciting their opinions as to the cause of dental erosion.

Nearly all of these letters were promptly and courteously answered, and many of them are worthy of mention in this paper; worthy, because they come from men who are known as careful observers, as well as earnest seekers for the truth. Their names will be withheld, except in those instances where permission has been given to use them. In many cases casts accompanied these letters showing peculiar phases of the disease, which, with their histories, form valuable data upon which to build.

One careful observer has said, "I believe it to result from a diseased condition of the mucous follicles immediately surrounding the neck of the eroded tooth,—that large form of follicles entering into the structure of the so-called 'ligamentum dentium.' In brief, it is a follicular inflammation, in which process is formed an acid (probably lactic acid) which in its nascent state flows out upon the tooth-enamel and dissolves it. Under its influence it has none of the features of ordinary decay. The solution of the enamel is complete. The dentine seems to require some slight friction, like that of the tooth-brush, to remove the decomposed substance. Illustration: I have one patient who has upon the labial surface of her incisors irregular depressions,—in some cases quite through the enamel. Her teeth are brushed with great care, and exhibit few evidences of ordinary decay. The erosion ceased years ago. I consider the inflammation to be the result of excessive brushing, possibly at a time when the mucous membrane may have been more than normally sensitive."

Another gentleman says, "I maintain that erosion of the labial or buccal surfaces of the teeth is produced by free acid, secreted by one or more mucous follicles in contact with the tooth. The investigation of a number of cases covering a period of twelve or fourteen years always terminated in the same manner, namely: the discovery of acid exuding from one or more follicles in contact with the tooth or teeth affected. The acid secretion of the follicles is not always present. I found in one or two persons that, after eating, the secretion of the follicle in contact with the tooth, when the mouth was at rest, did not show an acid reaction; yet before breakfast the acid was found to be present. In several cases the condition was reversed."

Accompanying this letter are two casts, with the following explanation:

FIG. 1.

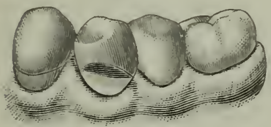
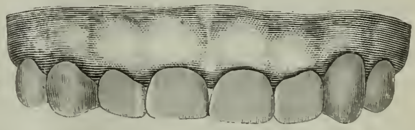


FIG. 2.



"Cast No. 1. (Fig. 1.) This was cut by the perverted secretion of two follicles.

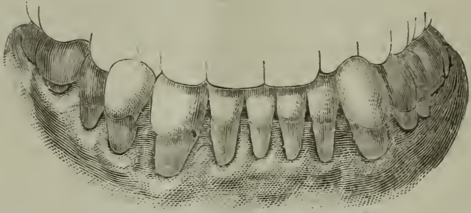
"Cast No. 2. (Fig. 2.) Two central incisors. The enamel was dissolved by the secretion of *five* follicles, secreting acid mucus during the night or when fasting."

It is perhaps not possible to so locate cause and effect with that degree of certainty.

Dr. S. B. Palmer has shown the accuracy of his discrimination in the following description of two unlike conditions, either of which might be considered by some, typical cases of the disease under consideration. One is doubtless a case of mechanical abrasion ; the other, one of chemical decalcification.

"A lady of middle age, who has used brush and tooth-powder to excess, with the following results : The anterior teeth, both upper and lower, have a V-shaped groove on the labial surfaces, at the junction of the enamel and dentine at the necks of the teeth. This groove in every way corresponds to the cuts and illustrations given in the books in articles on erosion, except that it is located at the necks of the teeth. There is this to be observed : The angles of the walls near the enamel are perhaps twenty degrees from a right angle with the face of the tooth, while the other wall is obtuse. Not a line in the enamel is visible to indicate grooves worn by the brush, and it would seem hardly possible that such perfect work could be done by a brush. That such is the case, the evidence is not wanting. In the lower jaw the bicuspids and first molar are missing, which gave opportunity to brush around the cuspid ; and the groove followed to the lingual surface, diminishing in depth at the angle or turn upon the cuspid. The secondary dentine is reached in one tooth, and the walls are polished and not in the least sensitive. In this we have a lesson (which may seem a digression). Had the cavities been formed by caries, several pulps would have been exposed, unless fillings had been inserted. Again, should the patient cease to use the brush, inflamed dentine would be the result, and the formation of secondary dentine would cease. The pulp makes a feeble effort sometimes to protest against encroachment of dark caries. I have found no attempt under light decay."

FIG. 3.



The above well describes a typical case of so-called tooth-brush erosion or abrasion. Every dentist is familiar with such cases, and the model herewith shown (Fig. 3) illustrates this in a striking manner. It will be observed that all of these are transverse cuttings, and to the most casual observer they would suggest the brush as the cause. The writer would not affirm that this condition had not been aided by the action of acid mucus, which is more than probable.

Again, Dr. Palmer says,—

"Case No. 2. Erosion from acids. I have two cases in mind, which have been watched with great interest for about twelve years. They are so nearly alike that one description will cover both. Two young ladies each complained of sensitive superior incisors. Examination showed undue whiteness of the teeth, with enamel removed to the dentine, one-fourth the size of the labial surface. The laterals were flattened, but not through the enamel. Both had been 'sucking lemons,' as they expressed it. The habit was broken up, and great care has been given in brushing. I see the cases twice a year. No further destruction has followed. The exposed dentine is in contrast to the enamel, but no other damage was done. Had these cases been followed with such brushing as they would have received without instruction, there would have been two fine specimens of dental erosion which could not have been accounted for. There would have been concavities in the four incisors, just as we see them in the books.''

Dr. Palmer has given us, in these last-mentioned cases, fine examples of chemical decalcification ; in other words, the erosion of the laboratories. The writer has frequently seen cases of this kind, and herewith submits this cast (Fig. 4), as showing the action of ''Horsford's acid phosphate'' and the immoderate use of acid fruits, accompanied with the vigorous wielding of the tooth-brush. I have seen the same condition of things in the mouths of two ladies who had taken the ''grape cure'' in Switzerland (Fig. 5). It is not as difficult to account for this kind of erosion on the anterior teeth as it is to account for the absence of it on the posterior teeth, which are subjected to the same, or nearly the same, amount of acid. We are quite ready to put two known facts together, namely, the acid and the brush, and then draw our inferences. But these conclusions are not entirely satisfactory when they are rebutted by missing links in the chain of evidence. We can produce the same, or nearly the same, appearance in the laboratory with almost any of the mineral or vegetable acids, as shown by the experiments of Westcott, Allport and Dalrymple, Magitot, Koch, Swain, Black, and Miller. An acid solution, tooth-brush, and powder will produce a very similar appearance, whether it be done in the mouth gradually or in the laboratory rapidly. And yet all of the experiments, more especially those of Drs. Koch, Swain, and Black, with a view of producing artificial erosion, were unsatisfactory.

FIG. 4.

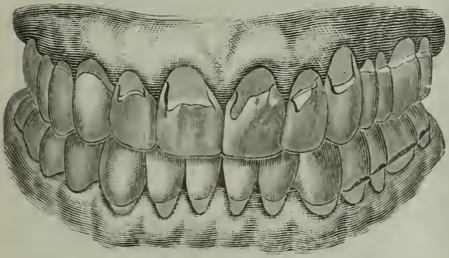
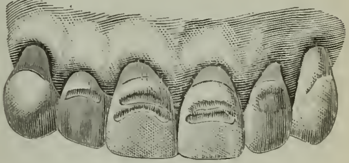


FIG. 5.



Again, Dr. Palmer says, when considering the peculiar phases of the disease under consideration,—

''I am of the opinion that the cause is due to acid mucus occasionally. The most pronounced case observed showed grooves across the enamel, with numerous small pits, not unlike what might be produced by electrolysis in the laboratory. All such manifestations, when undisturbed, affect the enamel and dentine in lines of easy dissolution. In the case mentioned with lateral grooves, I conclude that they were early established by illness, during the formation of the enamel. Any disturbance of the enamel at a given point, if continued for a given time, would make a groove parallel with the tooth. We also have this fact to account for the difference between erosion and caries at the neck of the teeth, as produced by general acid secretions. The acid mucus seems to be set free upon the crowns of the teeth; the friction of the lips keeps the surface clean and free from fermentation, and thus the difference between erosion and caries. Admitting that there are abnormal conditions, where the lips furnish acid secretions, and taking out all mechanical and other acid action, dental erosion seems not so very complex. The great trouble comes of compound association of the three agencies mentioned.''

I have quoted thus largely from Dr. Palmer's letter because it illustrates three unlike conditions, either of which has been described by some as typical cases of dental erosion. It is a little remarkable that such diverse conclusions have been reached by different observers, when describing the appearance and etiology of this disease. This may be owing, in large part, to the different characteristics present in a given case. For instance, the transverse grooves at the junction of the enamel and dentine, beautifully polished bottom and sides, suggest its mechanical origin, and the observer at once concludes that all erosion is of this variety. Another has never observed this phase of the disease, but has seen the cup-shaped depressions upon the masticating surface of the molars, and ascribes to it both a mechanical and a chemical origin. Still another has observed the longitudinal grooves and depressions upon the labial faces of the teeth, and perhaps festooned or crescent-shaped wastings upon the cutting-edge of the incisors, and concludes that these must be of a totally different character, as he has never seen it manifested in other ways. Hence the difficulty of obtaining from a large number of observers a uniform opinion as to the probable cause of a general condition, the factors of which may be two- or three-fold. Therefore, be it observed that the advocates of the purely mechanical origin of erosion, when their observations have been confined to the transverse grooves at the neck of the teeth, have at least a strong presumptive evidence to substantiate their theory.

After making due allowance for the diversity of observation and the faulty description of cases, I am of the opinion that the consensus of belief at the present day is, that erosion of the teeth is caused by an acid secreted by the mucous glands of the mouth, and that this, accompanied by the use of the tooth-brush, is sufficient to account for the great variety of characteristics presented. Were the disease confined to the labial and buccal surfaces of the teeth, such a theory would seem sufficient to account for many of the ordinary cases; but there are manifold peculiarities which make it almost beyond the credulity of the earnest searcher for truth to accept, unless it be admitted that the same or similar acids are operating in other parts of the mouth than those described, to produce results equally disastrous.

The writer has long been of the opinion that erosion of the teeth is the result of some constitutional derangement, which so alters the product of the salivary and mucous glands that instead of secreting a harmless fluid, it becomes one of acid reaction, capable of decalcifying the enamel and dentine, and that the inherent structure of the tooth, histologically considered, has nothing whatever to do with it.

The frequency with which dental erosion and the gouty diathesis have been associated in the cases coming under my observation has led me to believe that there is, in a much larger proportion of cases than we have been accustomed to think, a gouty diathesis, and that this, being unrecognized and uncontrolled, becomes the hidden and mysterious element which is producing such unsightly and uncomfortable conditions in the mouths of our patients.

I would not be understood as asserting that erosion and gout are always associated, for I have often seen the former where no symptoms of the latter have been recognized. Yet it must be remembered that the gouty dyscrasia may exist for a long period without serious impairment to the general health, and may never be attended by an acute attack.

It is not my intention to offer a paper upon the subject of gout, but rather to indicate some of the peculiar manifestations and coincidences which my own observation has taught me exist between dental erosion and the gouty diathesis. I shall, with your permission, give a detailed history of a few cases which I have studied with peculiar interest.

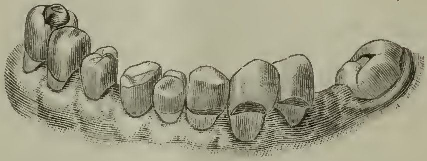
Nearly twenty years ago, a maiden lady of perhaps forty years of age, of wealth and refinement, placed herself in my hands for dental treatment. Both dental arches were filled with teeth, beautiful in shape and above the average density. At that time there was no appearance of erosion; but perhaps a year or two subsequently there appeared upon the labial faces of the central incisors, midway between the cutting-edge and the gum, slight eroded depressions, not larger than the head of a small pin. They did not present that polished appearance which so commonly attends the transverse groovings at the gum-margin, which was doubtless owing to the rapid changes which were taking place in the enamel. In the hope of arresting the disease, small fillings of gold were inserted; but it soon became evident that fillings were of no avail, for the disease continued around the fillings until they stood above the surface of the surrounding enamel, the undercuts and retaining points being exposed to view. Coincident with this, the laterals and cuspids began to waste away after the same manner. Nor was the disease confined to the labial surfaces. The palatine and approximal surfaces were equally involved. The masticating surfaces of the molars were cup-shaped, and in some instances the outline of the pulp-chamber was visible, although the occlusion of the opposing teeth did not reach to the depth of the eroded surface. After a period of six or eight years, these beautiful organs had been reduced to mere apologies for teeth. The incisors and cuspids had been dissolved away, until no enamel was visible upon the labial or palatine surfaces. The dentine had also wasted, until in one or two instances the pulp had become exposed, and the remaining portion of the dentine presented the appearance of a wedge. At last it was thought desirable to remove the remaining portion of the crowns, and artificial ones were engrafted upon the roots. The molars were filled in some instances, and in others gold crowns were used to protect what remained. The secretions of the mouth nearly always showed an acid reaction. Chalk was recommended, and used faithfully for years, likewise lime-water, but without avail. The interesting features of this case will appear when I mention the constitutional changes which were taking place in the individual.

Almost simultaneously with the first appearance of erosion of the teeth, there became apparent an inherited gouty dyscrasia, which had for generations been present in the ancestry of both branches of the family, the father having suffered from suppressed gout and the mother from rheumatoid arthritis.

The lady still remains under my care, and I have had ample opportunity to study the case, and have learned the following facts concerning her state of health :

The gouty symptoms manifested themselves by impaired digestion and nutrition, rapid falling of the hair, gastro-catarrhal affections, acid dyspepsia, eczematous conditions of the skin, and finally the arthritic deposits of urate of soda and uric acid crystals in the metacarpo-phalangeal joints of the fingers. At the present time there are nodosities which render them sensitive to the touch, and greatly deformed.

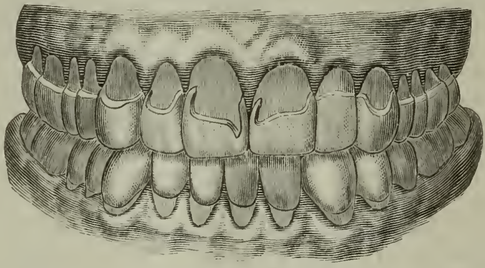
FIG. 6.



I herewith submit a cast of the inferior oral teeth (Fig. 6), showing what ravages the disease has made upon them.

By great care in the matter of diet, and by observing many of the required hygienic conditions, the lady enjoys moderately good health, and the disease in the remaining teeth seems to be progressing but slowly.

FIG. 7.



The second case, which is illustrated by the casts presented (Fig. 7), is one of the most interesting that has come under my observation. It is that of a maiden lady of at least fifty years of age, twenty-five of which she has been under my care. I question whether a more marked case of dental erosion could be produced. She comes of a gouty ancestry, and has suffered for many years from the concomitants of a gouty dyscrasia, although there have been none of the arthritic symptoms until quite recently.

It will be observed that the eroded surface of the incisors and cuspids covers nearly the whole labial aspect of the tooth. In some instances the pulp has become exposed, or so nearly exposed that it has become necessary to devitalize and extirpate. The bicuspids and molars have had like histories. The devitalization of these pulps has enabled me to answer to my own satisfaction the query which often arises: "Does erosion progress in teeth devoid of internal nutrition?" I can answer this inquiry with great positiveness in the affirmative, because I have seen a continuation of the disease in teeth from which the pulps were removed years ago. The lady is one of great intelligence, and has naturally seconded every effort on my part to ascertain the true cause of this distressing condition.

She has not been addicted to the use of acid fruits, nor has she wielded the tooth-brush with unreasonable severity. She has discovered a fact which most persons suffering from gouty dyscrasia learn by experience,—that a diet from which the carbohydrates, the sugars and starches, are excluded lessens the dyspeptic disorders so common in gouty subjects; and by maintaining a strict discipline in the selection of foods she escapes the serious consequences which a less careful regimen would entail.

Case No. 3 (casts of which I had hoped to have shown you, but which could not be obtained, owing to the gentleman's absence in Europe) illustrates, in a general way, the acid nature of erosion. It is that of a man sixty years of age, and the disease has been progressing twenty years, to my knowledge. The peculiarities are longitudinal grooves upon the labial surfaces of the incisors. The palatine surfaces have been entirely denuded of enamel, and there has been such a loss of dentine that the pulps, in at least two instances, have been exposed. Nor is the disease confined to the anterior teeth. The molars have been hollowed out to such an extent that there is but a thin layer of dentine covering the pulp. The gentleman has inherited gout, with all the entailments which the disease implies. He has for years suffered from acid dyspepsia, and visits Carlsbad annually that he may avail himself of the beneficial effects of those famous waters.

Permit me to relate one other case, the importance of which will perhaps justify me in occupying your time.

A lady of about twenty-eight or thirty years of age, who had originally teeth of superior quality, with fillings confined principally to masticating surfaces (but these fillings quite large), applied to me for general dental treatment. She had resided in another city, and had from childhood been under the care of a skillful and conscientious dentist. When I first saw her there was no indication of erosion upon the surfaces of her teeth, but she was suffering from so-called gout of the stomach. About this time she married, and in due process of time became a mother. There was an interval of perhaps a year or eighteen months that she did not call to have her teeth examined. When she did present herself for examination, I was shocked to find her teeth presenting the following appearance: The labial surfaces of the superior oral teeth had deep, saucer-shaped depressions, which penetrated the dentine, and which, probably owing to the rapidity of the process, had been left dull and unpolished. The masticating surfaces of the molars presented the most unique appearance. The fillings, which had been beautifully made by her former dentist in childhood, stood at least one-third above the surrounding tooth-structure.

The enamel had been dissolved away, until the buccal and palatine cusps were entirely gone, and deep depressions occupied the positions of once prominent cusps. The eroded surfaces were extremely sensitive, and the attempt to masticate solid food was attended with pain and inconvenience.

My first inquiries were directed in the line of her articles of food. I learned that she partook but sparingly of acid fruits, and never indulged in anything more acid than oranges, and then but seldom, as they did not agree with her digestion. It was then that I learned that she came from a gouty ancestry. Her father had recently died of some gouty affection.

I regret that I cannot show you casts of her mouth. The lady has recently removed to another part of the country, and for this reason impressions could not be obtained.

In the foregoing I have given to you, as briefly as I am able, the history of four cases which I have watched for years, in which dental erosion and the gouty diathesis are associated. Did time permit, I could mention others, the casts of which I have with me, but which do not present peculiarities unlike those described.

But you tell me that "one swallow does not make a summer," nor do a few cases of erosion, when associated with the gouty diathesis, establish a satisfactory argument in behalf of the theory that the two diseases are in any way related.

All who have studied the subject of erosion admit that there is a mystery which they cannot fathom; and yet there is a general belief that it is the result of an acid condition of the fluids of the mouth, more especially the product of the labial and buccal mucous glands. Granting that this be so, there must be some exciting cause which alters the character of those secretions, making them more than normally acid in their reaction, for the usual tests with litmus paper reveal a slight acid reaction in the mouths of nearly all persons, especially upon arising in the morning; and yet erosion is the exception, and not the rule.

That the exciting cause is a local one, the result of an irritated condition of the glands themselves, I cannot believe. That it is a constitutional derangement of the functions of the larger organs of the body, which so alters the character of the blood-serum, I do believe.

The humoral pathologists, from Hippocrates to Garrod, believed that the cause of gout was to be looked for in the perverted physiological function of the fluids of the body. Most modern pathologists are accepting the uric-acid theory of gout, as promulgated by Murray, Forbes, and Wolloston; while still others believe, with Cullen, that gout is a trophoneurosis. Whatever the cause may be, the manifestations are so protean that there may never be a perfect harmony of belief as to its origin. One fact is well established: that there is in the gouty subject a decidedly acid reaction to all the secretions of the body. Whether this pathological condition is sufficient to produce the changes which we recognize in the oral fluids, I am unable to say. However, that there are remarkable coincidences existing between the two diseases, there can be no doubt. Erosion, like gout, is a disease of advanced civilization. I have never seen it during the period of growth and development, when the processes of nutrition are active, and the consumption of food in excessive quantities is rendered possible by the large demands for the needs of the growing body and for the development of active energy. It is common in adult life, when the processes of nutrition are less active and when growth is complete, and when the supply of food needs to be regulated according to the amount of energy to be developed. Erosion, like gout, is more frequently than otherwise found in the person of those who live in luxury and refinement, and in an atmosphere where an abundant supply of oxygen is wanting. I do not remember to have ever seen a case of erosion in the mouth of one who earned his daily bread by the sweat of his brow. If, then, erosion be a constitutional disease, and in any way associated with the gouty diathesis, none but constitutional treatment will avail. I think it must be admitted that all efforts to arrest its ravages by local measures have resulted in failure. The heroic method of inserting gold fillings upon the eroded surface has done more than anything else to arrest its progress ; and yet I feel sure that your own experience has taught you that in some instances this has been ineffectual. The ingenious device of Dr. Kells, of having the patient wear a rubber splint to protect the eroded surfaces from the action of the acid mucus during the night, or when the mouth is in repose, may aid in retarding the disease, but it cannot wholly arrest it.

It would seem that the most logical line of treatment is in the direction of primarily improving the digestion, by the avoidance of such articles of food as experience has demonstrated are incompatible with the gouty dyscrasia. If there is one signal peculiarity in the digestive arrangement of gouty persons, it is their limited power to digest the carbohydrates, the sugars and starches. In whatever form these foods are used, they are more commonly the source of the dyspeptic troubles of sufferers from gout than are the albuminous foods. They provoke the acid and flatulent dyspepsia which so generally precedes the explosion of the gouty paroxysm. Abstinence from all the fermented preparations of alcohol is one of the most important restrictions, on account of the unfermented dextrine and sugar which they contain. Experience has shown that the prohibition of some of the sub-acid fruits—such as, for example, strawberries, apples, watermelons, and grapes—is attended with beneficial results. Next in order to the saccharine foods as the source of indigestion in gouty persons, come the amylaceous aliments. These constitute necessarily so large an element in ordinary diet that the limitation of them in the dietary of gouty persons applies, in the majority of cases, only to their excessive use. The purely starchy aliments, such as potatoes and the preparations of corn and rice, and even those which contain a considerable portion of gluten, like wheat, oatmeal, and barley, often provoke in gouty subjects a great deal of mischievous and painful indigestion.

"Next in importance to diet as a hygienic regulation in the management of gouty patients, is enforced exercise. The axiom of Abernethy, 'To live on a shilling a day, and earn it,' comprises the philosophy of the true relations of food to work, and both to the highest development of physical health. Exercise is to be enforced, not simply as the means of securing an active respiration, and thereby an abundant supply of oxygen, but also as a means of converting the potential energy of the food consumed into vital energy. The essential condition, moreover, of healthy nutrition in every organ and in every tissue, is the maintenance of a vigorous functional activity. Hence the question of exercise in its largest sense involves not only muscular work, but work of every kind which tends to promote a healthy activity of the psychical as well as the physical functions. Muscular exercise in the open air has a special value for the victims of the gouty dyscrasia, by equalizing the circulation, quickening the respiratory movements, and stimulating the elimination of effete matters from the skin and lungs. But mental work and wholesome diversions are not less important, as antagonizing the evil effects of indolence and over-feeding, which are among the common predisposing causes of acquired gout.''*

It is not my intention, nor is it my province, to enter into a discussion of the medicinal treatment of the gouty diathesis. Experience and observation have taught me that the greatest benefits are to be derived from the observance of the rules and regulations herein indicated ; and, whether my conclusions have been well founded or not, I feel sure that your future observations will reveal, in a larger proportion of cases than you now realize, that dental erosion and the gouty diathesis are frequently, if not usually, associated.

METHODS OF FILLING TEETH.†

BY RODRIGUES OTTOLENGUI, M.D.S., NEW YORK, N. Y.

(Continued from page 549.)

I PASS now to bicuspids, and in doing so I cross that line which by some has been erected as a point beyond which it is permissible to fill teeth with gold or with amalgam, according to the pocket-book of the patient. I have already said that a money consideration is an unscientific standpoint from which to choose a filling-material. Yet I must recognize this line, or at least the territory on one side of it. Nothing would tempt me to fill any incisor or cuspid with amalgam, except in rare cases where the cavity extended under the gum in such a way that my judgment should indicate that gold would fail. Consequently in crossing the line I must admit that I enter the domain of amalgam. Yet even just across the border I do not yet meet amalgam, for I cannot remember to have used it to any extent in the mesial surface of a first bicuspid.

The minute crown cavities found at the extremities of the sulci in bicuspids are extremely important, especially when found in the mouths of young persons. Nothing is easier than to fill these, yet it is an uncommon thing to see them filled properly. What is the reason of this? It will be profitable to discuss it a moment. A well-dressed young miss of fourteen to sixteen, let us say, is brought into the office for an examination. The mirror alone shows large cavities in all four of the sixth-year molars, for the parents, though well bred, stupidly "took them for temporary teeth." Smaller cavities of a similar nature are seen in the twelfth-year molars. Frequently the operator

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* Dr. Draper, in "System of Medicine."

† Copyright, 1891, by Rodrigues Ottolengui.

stops his examination at this point, because he has found enough to begin with. He tells the parent that the child has been brought in "in the nick of time, for in a few weeks the pulps would probably have been exposed in one or two teeth." He therefore chooses the worst and makes a start. Perhaps, after all, a pulp is exposed, which means destruction and all the trials and tribulations which follow. Eventually a superficial glance is made at the other teeth, and if an excavator catches in a bicuspid, the parent is admonished to bring her in again in a few months. Now such work on the part of the dentist, though thoroughly conscientious, is not well directed. The bicuspids have been neglected, and are sure to suffer from such a course of treatment. In my opinion, the proper way to examine a young mouth is to begin with a very fine-pointed explorer and examine closely each end of each sulcus, searching for a place, however tiny, where the instrument will penetrate to the dentine. I chose a "well-dressed" miss, for the reason that in such a mouth we would probably find clean teeth, and invisible decay as a consequence. If the explorer discovers a cavity, however small, that tooth must be filled *first.* What about those gaping cavities in the molars? Let them wait, I say. They have been waiting for months, and a day or two more will not make much difference, whilst to begin with them, as I have shown, usually leaves the bicuspids unfilled. The bicuspid with its small cavity, when we consider its immense value in mastication, its ready salvation if immediately cared for, and the extreme difficulties which it may bring to us later if not saved at the outset, certainly must be counted as worthy of our first attention. Of course there is no need to neglect the molars to their detriment, either. If the work cannot be done coincidently, the decay may be removed from the molars and temporary fillings inserted, whilst we give our first attention to the bicuspids.

FIG. 152.

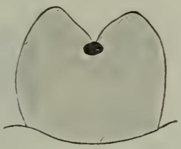
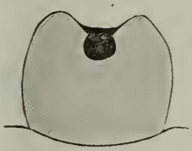


FIG. 153.



Whether the crown of the bicuspid shows one or two cavities, is immaterial. In either event the sulcus must be cut out entirely across from end to end. This I have stated before, and I said that there may be a few exceptions. These will occur more often in the lower jaw, and are confined to that class of teeth in which there is no well-marked sulcus, but simply a pit at each side, the cusps being fused along the median line. In all other cases, extend the cavity to the full length of the sulcus, and, moreover, it must not be cut out with a tiny drill, and filled afterward so that a thread-like streak of gold is all that shows. Fig. 152 is diagrammatic, and is introduced to show the fallacy of this procedure. It gives a section through a bicuspid, and shows the tiny filling lying at the bottom of the sulcus. To so fill a bicuspid gives the operator a chance to exhibit his skill, for it is more difficult to place a solid filling in such a place than where the cavity is enlarged. Early in my career it was my pride to make these thread-like fillings in bicuspids, and in molars as well, following all the windings of the sulci. But it is an error, for it leaves the sulcus practically existent, and in it food will lodge, so that caries will probably recur, the gold dropping out. Fig. 153 shows an enlargement of the cavity, the filling now extending up and filling the sulcus, so that we have left the cusps sufficiently well marked for masticatory uses, whilst we have obliterated the dangerous lodging-place for food and other material. In order to be sure to have sufficient gold in this sulcus, it is well to overbuild, so that after doing so the gold must be cut away to permit normal occlusion. By this means we have as much gold as will be tolerated, and the tooth is safer for it. This rule holds with all crown cavities. The preparation of the cavity to make it retentive is simple. With a reversed-cone bur dip into the cavity at one end, and cut until it emerges at the other. This will form a slight undercut, which may be deepened by following the same course with a wheel bur. Before filling, a fine hatchet excavator should be introduced at each end to make sure that all caries is removed. The depth which will often be reached before this is done will astonish those whose habit has been to neglect bicuspids till the cavities become visible to the eye. For these cavities gold is the only proper material, and it can be placed so rapidly and readily that there is no excuse for the use of amalgam.

FIG. 154.

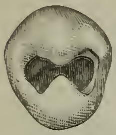


FIG. 155.

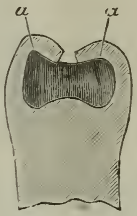
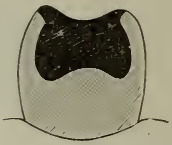


FIG. 156.



Leaving Fig. 153, no special directions are needed relating to simple crown cavities till we come to such as is shown in Fig. 154, a sectional view of which is given in Fig. 155. The entrance to this is along the full extent of the sulcus. If prepared with engine-burs alone, it would be more than probable that much caries would be left unremoved. Generally speaking, it should be remembered that the dentine, as a whole, assumes about the same form as the entire tooth. From this it follows that as the enamel over the cusps forms cones, underlying this enamel in a healthy tooth we would find cones of dentine. Caries finds its way through the weakest part of the enamel, which is along the sulcus, but once it reaches the dentine, further loss of the enamel is rather by a destruction of the dentine, so that the enamel thus undermined fractures under the force of mastication and caves in. Frequently, however, the teeth come to us thoroughly undermined, but with the enamel apparently intact except at the small orifice along the sulcus. Thus the dentine just under the cusps, though decayed, might be left in the cavity unless special care be taken to remove it. A shepherd's-hook excavator might accomplish this, but the result is scarcely desirable, as even where all the carious dentine is successfully taken away the cusps, unsupported by dentine, are likely to crush under mastication later on. I therefore advise the free use of the chisel to thoroughly expose the cavity, and reach strong borders. With a sharp chisel placed at the points *a*, *a*, gentle taps of a mallet will remove the overhanging enamel readily and painlessly. Painlessly, because the enamel is taken off in the line of fracture, so that the patient finds no concussion from the mallet-blow. The final arrangement of the cavity is best shown by a diagrammatic illustration, as seen in Fig. 156. This may be considered a section through the tooth, and shows first that the cusps have been cut away so that the filling when inserted covers them sufficiently to afford protection, and secondly we see that in finishing the filling no attempt has been made to exactly reproduce the form of the masticating surface. The filling is merely made to resemble a bicuspid crown in a general way, being left smooth and gently curved, so that it is readily cleansed.

As to selection of filling-material, I should certainly lean toward gold, unless contraindicated by circumstances peculiar to an individual case. To pack the gold I should resort to the method of using oxyphosphate in the bottom of the cavity, pressing in the first pellets whilst the cement was still plastic. This I shall describe more particularly when I come to molars. Where a dentist prefers to use amalgam, it will be seen that no alteration of the cavity will be required. Neither need I give any special directions for placing the amalgam, the cavity being very simple. I should insist on the return of the patient for subsequent polishing.

In Fig. 157 we have a bicuspid from which one cusp has been lost. When this is the palatal cusp it would be as well not to attempt a full restoration, but to be satisfied with an approximate contour, so that the tooth when filled may appear as shown in Fig. 158. This is diagrammatic, giving a section through the filled tooth, and indicating the outer form attained, as well as the relation of the gold to the cavity itself. Where, however, the cusp which is absent is the labial, it will not answer to so proceed, for by not reproducing the full cusp we leave an ill-shaped tooth to attract attention, especially as the occlusion would not be reached. Of course the occlusion would not be reached in the first case either, but being out of sight this would be of no importance. Occasionally we may be able to anchor a filling of this nature so securely that we may be satisfied to risk a full contour. Where it can be done, the procedure is as follows. The removal of all decay would give us a general concavity of somewhat irregular shape.

Begin by forming deep grooves along each approximal wall, as indicated at *a*, *a*, in Fig. 159. Unite these with a groove around the labial wall, as at *b*. This will give a groove of horse-shoe shape. Make extensions at the labio-approximal angle on each side, as deep as safety will permit. Note that the groove is a horse-shoe, the circle not being completed. To do so would mean to extend the groove along the base of the remaining cusp, which would greatly weaken it, without affording adequate compensation for the risk involved. In fact, except in rare cases, where the standing cusp is found unusually strong, do not attempt any undercutting or grooving at this point at all. A general concavity of the whole inner surface of the cusp, as at *c*, will be sufficient to act with the opposing groove, and retain the full contour. Or if not, then one or two gold screws should be employed. A first glance at Fig. 158 might leave the impression that the filling would not remain in place because of the fact that only a single retainer, *b*, is shown. It must be remembered, however, that this, which here is at the palatal side of the tooth, is analogous to the groove at *b* in Fig. 159, where it occurs at the labial. The section does not indicate the lateral grooves, which would occur in such a case as Fig. 158, just as has been described in Fig. 159. As to filling-materials, in such a case as Fig. 159 it seems to me that we must use gold, as the contoured cusp is exposed to view. In Fig. 158, where the whole filling will be unseen, amalgam may be used under some circumstances, as for example in the mouth of one for whom a lengthy operation would be a risk, because of shock. Ordinarily I should use gold in either case. I should begin at the end of the distal groove, and, using pellets, build around till the groove itself was solidly packed. Then I should build across, connecting the two arms of the horse-shoe groove, so covering the floor of the cavity. Keeping my gold with a flat surface, I should build up till on a level with the border where the cusp was absent. Next work toward the remaining cusp, and cover it completely with a thin layer of gold. This is an important point, and that I may be better understood I will resort to a diagram. Fig. 160 shows the tooth in section, filled to a level with the labial wall *b* (supposing that we are dealing with Fig. 159). It is plain that up to this point it has been easy to keep the direction of the plugger and mallet-blow perpendicular to the long axis of the tooth, or in line with the length of the root. By this method the blow receives the greatest resistance, so that the gold is most solidly packed, while the patient reports the least pain. Were we to proceed thus to the end, it would be found that we would be constantly called upon to pay special attention along the standing wall, as for example at the point indicated by *a* in the diagram. We should be compelled to place every piece at that point, first building from there outward, or else risk imperfect packing at this point. In this way we would lose the horizontal plane, the surface of the filling soon becoming oblique. Thus throughout the rest of the operation the mallet-stroke would not be perpendicular to the root. I advise immediately covering the wall as shown in the diagram at *c*. To do this of course necessitates either hand-pressure, or the mallet at an oblique angle. Even the latter, which is preferable, would cause little pain, because the wall would be sufficiently covered with a few pieces of gold. With the cavity filled up to the point shown in the diagram, the completion may be carried on with com-

FIG. 157.

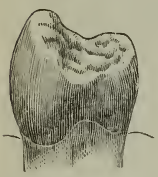


FIG. 158.

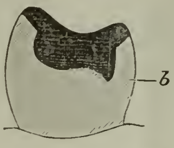


FIG. 159.

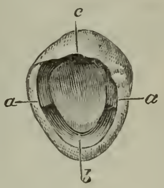
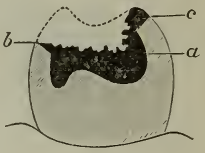


FIG. 160.



parative rapidity, because the tooth-substance being all covered we have no further anxiety in that direction, but may devote our attention exclusively to shaping the contour. From this point use heavy foil, No. 30, or possibly 60, cut in square pieces, and pack from the cusp *b* toward the point *a*. Allow each piece to overlap the cusp *b*, and in this manner the labial portion will grow sufficiently outward, so that surface packing will not be required when the contour is formed. This is a most important point, for we must have the labial surface dense so that we may give it a high polish, yet it is undesirable to be compelled to pack gold on that part of the filling at the end of the operation, because the force of the blow would be at right angles to the tooth, which by this time may have become so tender that this would be exceedingly painful. It can be readily avoided if the caution to build over the edge with every piece be heeded.

There may be some who will argue that I am in error when I state that no special retaining-point or undercut should be made along the remaining cusp. Yet if so, what are we to do where both cusps are lost, as in Fig. 161? In such a case the same method which I described in connection with Fig. 159 may be followed. Here, however, we do not make the groove a horse-shoe, but complete the circle, for we have no standing wall in danger of being undermined. Fig. 161 shows the cavity prepared for filling, the groove being seen at *a*. In Fig. 159 I advised retaining extensions at the labio-approximal angles. In this case they are to be made at the palato-approximal angles also. Thus we would have a filling which, if removed from the tooth for examination (the tooth having been extracted and cracked open), would appear to have four legs to stand upon, which legs would flare outwardly to a slight extent. Fig. 162 gives a section through the tooth and filling, where the retentive arrangement is readily seen. Where the depredation extends beyond this, so that good retaining-grooves and extensions could not be made without endangering the pulp, it would be better to depend upon four screws, which should be thoroughly well anchored when asked to hold so great a contour.

FIG. 161.

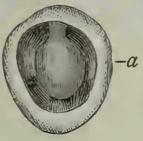
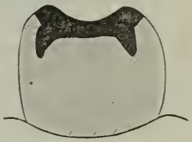


FIG. 162.



In molars we find a greater variety of crown cavities. As in bicuspids, there is a class which should receive our immediate attention. I said that with children I usually begin by searching for and filling the cavities in the sulci of bicuspids. This done, I next examine the crowns of the superior sixth-year molars. In the pit at the bottom of the anterior sulcus we are most likely to find at least a small cavity. Call it a cavity, and fill it with gold, if the point of a fine explorer can be made to penetrate so that there will be some difficulty in removing it. When caries has but begun, there is no trouble to fill with gold, for the dam is not a requisite, though always an advantage if it can be used without serious objection. I seldom resort to it with these teeth, because they can be filled so quickly that it is better to depend upon the napkin than to risk too much annoyance to a young patient. Usually a rose bur will sufficiently shape the cavity, cleansing it and making it retentive at the same time.

Nevertheless, before filling, it is safer to examine with an excavator, lest some white caries be left. The cavity all ready, fold a large napkin once, and introduce the doubled edge into the mouth and back behind the first molar, where it is held in place with a mouth-mirror, which at the same time reflects light into the cavity. Should there be danger from the saliva flowing from the duct of Steno, a roll of bibulous paper placed between the gums and cheek will suffice to dam it off. Dry the cavity thoroughly with hot air, and select for the first pellet one which will wedge in the cavity. Better still, use crystal. Use a shepherd's-hook plugger if working by the reflection in the mirror, or a slightly-bent bayonet if the patient is tipped back so that the cavity can be easily seen. Depend upon hand-pressure to start the filling, but as soon as the floor is covered and the gold packed is immovable, resort to the mallet. Here the engine-mallet or the electric is most convenient, because one hand is engaged with the mirror. In such small cavities pellets will be more convenient than heavy foil, but the latter should be used at the last. Fill with pellets up to the level with the actual borders of the cavity, and complete with heavy foil, building up so as to lessen the depth of the sulcus.

Next, attention should be given to the posterior sulcus. Here we often find a cavity which will be much more trying, for which reason the rubber is more necessary than in the last case. In this place the decay often extends, though perhaps merely as a line of discoloration, into the palatal groove. When this occurs, or in fact in all cases except where the groove is scarcely defined, the cavity should be extended into it, as is well shown in Fig. 18. It is this extension which will often try the patience of the operator, especially should he be compelled to trust to the mirror for a view of his work. After many and varied experiences, I have decided upon the following method as being the most feasible, and applicable to the greatest number of cases: After fully extending the cavity to the extreme end of the palatal groove, with a sharp spear-drill make a deep pit at this point obliquely, being careful, however, not to wound the pulp. Next enlarge this pit with a rose bur, after which bring the bur forward toward the crown cavity proper, forming an undercut along the sides of the palatal extension. Now exchange for a wheel bur, and pass it the full length of the crown cavity, forming an undercut along each side and at the buccal end. A point of interest is worthy of note here. The caries which decided the operator to fill this cavity most probably was noticed at this buccal end of the sulcus, and is usually found burrowing toward the pulp rather than toward the distal aspect of the tooth. Thus it is essential, after using these engine instruments, to explore for caries at this buccal end of the cavity. In the majority of instances it will be necessary to remove decay, and pain, if experienced at all, will be felt at this time. Thus it is a valuable axiom, that *in all distal or inaccessible crown cavities the mesial side of the cavity should invariably be explored with a shepherd's-crook hand-excavator*, or other shape suitable for reaching this unseen part of the tooth.

The cavity prepared, the filling should be with gold, and is to be started with crystal in the pit made at the end of the palatal extension. All of this extension may be partly filled until the gold is built well over into the crown portion. It may then be continued with pellets and the mallet until two-thirds completed, when heavy foil should be used in pieces that are narrow, and long enough to extend from the buccal to the palatal end of the cavity. By thus beginning at the palatal end, passing toward and into the crown, finally returning toward the starting-point, the cavity may be rapidly and easily filled. To begin in the crown, however, and build over into the palatal extension, will often be found most tiresome and perplexing.

I have elsewhere designated these two cavities as an exception to the general rule of opening up sulci from end to end. Where considerable caries is present, and the removal thereof discloses the fact that the two cavities are united below the enamel by a narrow passage, I think it best to open up the two into a single cavity, which would then appear as shown in Fig. 163. Here it is to be observed that the two cavities are connected only by a narrow passage. This should only be done where the enamel at *a*, *a* is well supported by strong dentine beneath. Where the dentine is carious or absent, they should be cut away freely till a strong wall is reached. This cavity will ordinarily be easily filled with either gold or amalgam, the former, of course, to be preferred, unless contraindicated by circumstances. No special arrangement is necessary to assure retention, for each cavity usually presenting of general retentive shape, the two when united form the strongest cavity that could be designed.

FIG. 163.

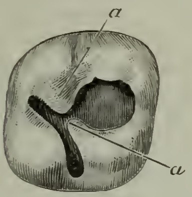


FIG. 164.

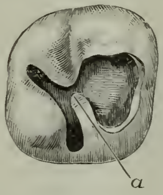
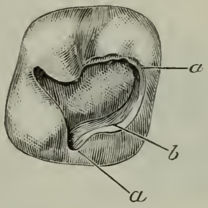


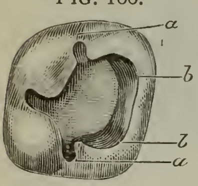
FIG. 165.



In connection with a cavity of about the magnitude of that prepared in the last case, we will sometimes find one cusp so undermined by decay, or so imperfectly calcified, that it must be removed in order to reach strong walls. A point of special interest here is the palatal groove. Even supposing that it should be non-carious, it is essential that at least a slight extension of the cavity should be made in that direction. This will give us a cavity shaped as seen in Fig. 164, the antero-palatal cusp being absent. From this it is at once apparent that a point of weakness occurs at *a*, where we find that all that is left of the cusp is frail. It is therefore obligatory to remove it, so that the cavity ready for filling would appear as in Fig. 165. For the retention of the filling, a deep groove should be formed along the approximal border and around the palatal portion as far as the palatal groove, as indicated at *a*, *a*. At the palatal angle *b*, a depression is to be made as deep as possible without danger to the pulp. Along the base of the standing walls slight undercutting may be resorted to, but care should be taken not to undermine and weaken what is to be the strongest support. This caution especially applies to the antero-buccal cusp, which is in danger of subsequent fracture. The case described being one in which the depredation is supposed to involve the approximal portion only very slightly, it is plain that the dam could be placed save in exceptionally short, or abnormally conical teeth. Therefore I should choose gold as a filling-material. I should start the filling at the palatal angle in the deep dip formed at that point, build backward to the palatal groove, thence over the floor of the cavity and along the walls, and so around and back to my starting-place. All the exposed portion of dentine being thus covered, and all borders perfected, the contour could be rapidly completed by using heavy foil and fairly large instruments with the mechanical mallet. A word as to the contour here. As it is not to show, there is no special object in building the cusp up to the full original height, it being remembered that the more gold the weaker the contour. Were this the buccal cusp it would be more essential to fully restore it, since it would be exposed to view. But in no case need the exact lines of the original be reproduced. An approximate contour will be sufficiently serviceable, and will prove more durable than where deep depressions are made in simulation of the normal sulci.

Where two cusps are absent, if they be the anterior ones, we must observe the same caution at the buccal groove as was advised at the palatal, and remove weak enamel as far as both of these grooves. Such a cavity prepared for filling is seen in Fig. 166. The retaining groove *a*, *a* now assumes a half-circle, whilst we have two depressions, one at each angle, *b*, *b*, and there is a slight undercut along the standing wall as before. The filling with gold is practically as in the last case. The general arrangement of these cavities will be as described, regardless of which cusps are lost. In some conditions it may be found advisable to resort to screws, whilst the method shown in Fig. 102 may be adopted in extreme cases. As long as the approximal surface is only slightly encroached upon, however, the fillings can be sufficiently anchored without the screw, or holes cut through the walls, for we could make the groove and retaining depressions of sufficient depth and strength.

FIG. 166.



Where three cusps are absent, the groove is extended still further, and a third depression at the third angle is to be made. With the disappearance of the fourth cusp we have the groove a complete circle, four retaining depressions being needed, one at each angle, and the tooth is filled and the filling retained exactly as described in connection with bicuspids, and illustrated by Figs. 161 and 162.

Whilst I prefer gold for all four of these crown contours, amalgam may be used with success. The dam should be placed, the cavity being shaped the same as where gold is to be depended upon. The amalgam is then packed thoroughly into all undercuts and retainers, being forced into them with balls of bibulous paper as has been described. Supposing that all four cusps were to be restored, thus choosing the filling of the greatest magnitude, in this class, the amalgam should not be mixed too dry. There should be sufficient plasticity to last during the packing without danger of fracture, or flaking off. The full contour would be restored, the top of the filling appearing convex. The next step is to hasten the setting of the mass by the addition of gold foil, as described in connection with the use of amalgam. The foil is cut or torn into small pieces, preferably as thin as No. 3 foil, and a single piece laid over the amalgam. This is then burnished into the filling with a *smooth warm* burnisher, and becomes incorporated with it. This is continued until it is found that the amalgam is hardening. Then the contour may be perfected by carving gently with a right-angled spatulate burnisher. The burnishing of gold is then continued, smaller ball burnishers carrying the foil into the depressions which have been carved out, and rounding and perfecting the lines. This is kept up till the filling is set enough to be dismissed in safety, at which time it will usually appear to be a gold filling, the final pieces of gold retaining their color. This, however, is lost in the subsequent crystallization, so that when seen at the next sitting the usual amalgam color is presented, save perhaps in spots. A peculiar squeaking sound as the burnisher passes over the surface will admonish the operator that the mass has begun to harden. If the filling after setting be thoroughly polished, it will appear very handsome, and will prove a good and durable piece of work.

I must refer to the large crown cavities, where the cusps are intact, but where the cavity itself is so large that further extension in any direction, either for starting-point or for retention, would so weaken the wall as to make subsequent fracture a probability. It is evident enough that such a cavity will retain the filling once we get it in, but how shall we accomplish this with gold? It is in this class of cases that the oxyphosphate method is found most satisfactory. I promised to explain this in more detail, and will do so here. After the removal of all decay, the dam of course being in place, mix oxyphosphate to a *sticky* consistency, and place it in the bottom of the cavity. Whilst still plastic, press into it two or three large pellets of gold foil loosely rolled, and without condensing let the whole rest till the cement sets hard. We then have such an appearance as is shown by Fig. 167. In this illustration, *a* represents the oxyphosphate, which it is observed has been squeezed out over the borders, *c*, *c*, whilst *b* shows the loosely packed gold bulging out of the cavity. As soon as the cement is set, whilst waiting for which gold may be prepared for filling the tooth, the next step is to condense the gold and remove the excess of cement. This done, the presentation would be as in Fig. 168, *a* once more showing the phosphate, whilst *b* indicates the gold condensed and cemented to the floor of the cavity. It is to be noted that the unfilled portion of this cavity is still retentive, so that whilst the gold is actually cemented to the tooth, no special dependence is placed upon that for keeping the filling in the cavity. To continue this filling care must be taken to cover the phosphate at the

FIG. 167.

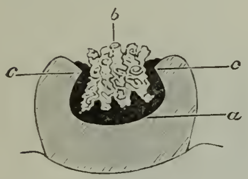


FIG. 168.

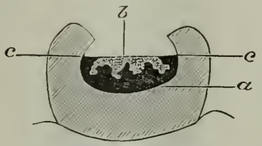
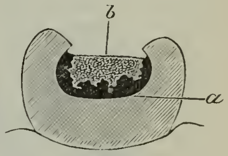


FIG. 169.



exposed points *c*, *c*, so that no particles may be chipped off to interfere with thorough cohesion. This is best done by carefully laying in pieces of heavy foil, uniting them at the center with the gold already in place, and extending them over the phosphate till the entire floor is presented as a gold surface, when the completion of the filling is comparatively easy. Where amalgam is to be used, the procedure is similar, with a noteworthy exception. The appearance after removal of the excess of phosphate would be as seen in Fig. 169, *a* as before representing the phosphate, which here extends higher up the sides of the walls, whilst *b* is now the amalgam. The completion would leave but a small portion of the amalgam in actual contact with the dentine. Amalgam fillings thus inserted do not discolor the teeth.

In the preparation of a crown cavity in a molar, especially in the lower jaw, it will occasionally occur that in following the direction taken by the caries, we discover that it has eaten its way through to the approximal surface. I have elsewhere said that where a cavity occurs in the crown, and another in the approximal surface of a molar, they should be opened up and filled as one cavity. I did not mean this, however, to include all cases. My language is, "Where a crown cavity in a bicuspid or a molar is but slightly separated from an approximal cavity, the two should be united and filled as one." The word slightly here indicates where I should make an exception to this rule. Where the caries has originated in the crown, and tunneled through to the approximal surface, we will most frequently find occasion for treating differently. The management would depend upon the size of the approximal orifice. If the opening at that point were small, it will be best not to connect the two cavities further than by the tunnel made by the decay.

FIG. 170.

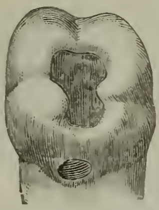


FIG. 171.

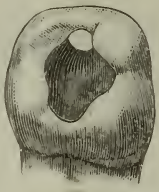
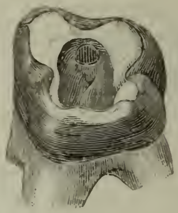


FIG. 172.



A condition of this kind is seen in Fig. 170, Fig. 171 showing posterior view of same, and is from a case in practice. A lady presented with a leaky gold filling in the crown of a first molar. Considerable decay was found underlying the gold, which upon removal disclosed the fact that the cavity had reached the posterior approximal surface, the opening there being small and near the gum. This tooth and the adjacent molar were in close contact, and it was desirable, because of the patient's enfeebled health, to submit her to as little annoyance as possible. The idea of wedging, in order to fill the approximal cavity separately, was abandoned. The procedure was as follows. A narrow strip was cut from thin German silver and pressed between the molars. Next a wooden wedge was driven between this strip of metal and the adjacent tooth, so that it was forced tightly against the opening of the cavity, completely covering it. Amalgam was then introduced through the crown cavity and packed against the German silver. The crown cavity was filled with gutta-percha, and the patient dismissed till the following day. At her next visit the crown cavity was filled with gold, using the method of employing oxyphosphate for starting. This served the additional purpose of separating the gold from the amalgam already in place.

I will introduce a second case from practice, of a somewhat similar character, which received different treatment, though following the same general principles. A lad of fourteen was in my care for the regulation of his teeth, which necessitated the contraction of the arch. As a retainer, bands of pure gold were accurately fitted over the first molars on each side, and to them was soldered a gold wire which, fitting around the arch, restrained all the teeth. Subsequently he came in for an examination, and I found an old amalgam filling in the crown of one of these banded molars leaking badly. Upon its removal I discovered the same condition as last described, the caries having reached the posterior approximal surface. This allowed the gold band to be seen, as is shown in Fig. 172. This retaining fixture having been permanently in place for over a year, I simply filled the entire cavity with gold, building against the gold band at the point where it was visible through the approximal opening. When the time came for removing the retainer, the wire was cut and the band around this tooth allowed to remain in place permanently, appearing as an open gold crown. This will suggest a method which I have in many cases used with success. That is, where a molar is imperfect, or badly undermined along any surface, communicating with a crown cavity, a band such as in the above case may be made and cemented about the tooth, before the insertion of a filling.

Where a crown cavity emerges at the buccal aspect, leaving considerable dentine bridging the part between, it may be filled with a continuous gold filling, by first closing the buccal opening with oxyphosphate and allowing it to set. Then the crown may be filled, and this done the phosphate may be removed from the buccal part and the filling continued. With amalgam this would not be necessary. I once had a case where the pulp had died, the cavity in the crown being quite extensive. Removal of decay disclosed the fact that caries had penetrated the palatal side of the tooth, forming a long groove below the gum-line. A piece was cut from German silver, which, wrapped around the tooth, allowed an extension to pass between the tooth and the gum at the affected point, and so reached the opening. This was held in place by winding flax thread around the tooth, and the cavity was filled with amalgam from the crown, the material being packed against the German silver. This avoided forcing the amalgam through against the gum, and saved the annoyance of passing burnishers below the gum, which when attempted caused profuse hemorrhage.

This will be an opportune place for considering the union of two or more teeth by a single filling. This may be done either for securing a bridge in position, or where, one tooth being loose, we wish to support it by permanently uniting it with its neighbor. It has been claimed by men of repute that these operations can be successfully accomplished by simply holding the bridge-piece, or the bar, as the case may be, until filled around with gold. I have never been able to do this with any degree of satisfaction, or with results of which I felt proud. By the following method, however, I have found the obstacles removed, and success attainable with a sufficient degree of certainty. Where a bridge-piece is to be retained in place by extensions into cavities cut in teeth, held by gold filling, the dam being on, first set the piece with oxyphosphate, and allow the cement to harden thoroughly. Then *remove all of the phosphate from one cavity* and replace it with gold, the piece meanwhile being firmly held in the desired position by reason of its connection with the other tooth. One end secured by gold filling, the same process may be repeated at the other end.

In uniting teeth, use always gold and platinum, further strengthened by a triangular iridio-platinum bar. Amalgam will not serve for these cases, and even gold alone is not durable enough where there is likely to be much strain. The teeth are first to be bound together by flax threads, as shown in Fig. 49, if the teeth are two molars, or as in Fig. 50 when the anterior teeth are involved. If the teeth are quite loose, it will be necessary to imbed them in oxyphosphate, leaving only that part exposed which is to be filled. Next the bar is to be placed in the continuous cavity cut in the crowns of the adjacent teeth, and cemented to place. When the oxyphosphate has thoroughly hardened, as in the case of the bridge-piece, remove it from one cavity and replace with gold; the bar being thus secured, the rest of the cement may be taken out and the operation completed.

(To be continued.)

SECONDARY DECAY AT THE CERVICAL MARGIN.

BY STEWART J. SPENCE, DEER LODGE, TENN.

THE surfaces of human teeth abound in wavy lines, presenting a marked contrast in this respect to the simple, plain, and rectilinear structures, carved out of a block of ivory, with which, about fifty years ago, the dentist adorned the features of his patient. A human central incisor has what would otherwise be the dead evenness of its labial surface broken up by two wave-troughs and three wave-crests running parallel with the axis of its length, which reflect the light less glaringly than would an unbroken surface. This effect is heightened in some classes of human teeth by wave-lines running transversely along the face of the tooth on its upper portion, and forming, as it were, the wrinkles of its brow. It also is given a wavy line of beauty traversing its incising edge, until the action of attrition has destroyed this. It moreover presents two beautiful and more sweeping lines or curves, one on each side, at what we term its approximal edges,—that is, the edges which are presented to the eye of the observer as he stands immediately before the tooth, looking straight at it.

But the subject of this communication are certain lines of depression which lie immediately beyond the last-mentioned curves, but which are unlike them in not being easily observable to the eye, and being thus out of sight they are apt to be out of mind, and because of this they are the innocent cause of much secondary decay at the cervical margin.

My excuse for calling attention to this subject is that, although the facts here stated are doubtless well known to the majority of the members of the dental profession, the subject has not received, in the literature of cervical decay, the emphatic treatment which its importance deserves (unless such treatment has escaped the writer's reading), and is perhaps still *terra incognita* to some of the younger or less observant members.

If the reader will take up an incisor (or almost any other tooth, for that matter) and hold it with either of its approximal surface towards his eye, he will readily observe, in a large proportion of teeth, a groove running parallel with the tooth's length, commencing about half or two-thirds up the crown from the cutting-edge, and sometimes extending quite a distance up the root. Let us suppose that this tooth, instead of being extracted, is presented for filling. The dentist fills it with gold, being careful to even overfill it a little, especially at the cervical margin, so that there may be no deficiency of gold at that important point when the plug is finished. The finishing is done with disks or emery strips, and the margins which are in sight, and where there is no danger of secondary decay, are finished to beautiful evenness with the cavity's edge. But in the dark depths between the approximating teeth, where the danger lurks, there is an unobserved defect. If the operator will reflect light by his mouth-mirror from beneath the tooth and peer carefully into this approximal depth, he will see a dark line running along the upper edge of his filling, appearing very much as though he had left an unfilled space lying between his gold and the cavity's margin. It is, however, not this, but just the opposite,—a superabundance of gold; and if he will take a pointed instrument and run the point downward from the gum to the filling, he will find the movement of the point checked by an extruding portion of the filling, which, by lying in the before-mentioned groove, has been passed over by the emery cloth with little or no friction and perhaps retains a rough edge, well calculated to detain in its depression particles of food to commence again the process of decomposition.

The remedy is either to continue cutting away the tooth with the emery strips, or, more properly, to cut away the extruding gold by a suitably shaped lancet, or fine-headed files.

The danger indicated above in connection with the incisors is doubly to be apprehended in the bicuspids and molars, not only because this troublesome depression in them is generally deeper and wider than in the incisors, but also because it is more difficult to detect by sight after the filling is inserted. Fortunately, however, prior to the insertion of the filling this groove is, because of its greater size, less difficult to observe in these latter teeth than in the former, and thus the dentist, forewarned, can afterward act accordingly. In many cases a matrix can be so shaped that with proper wedging, the cervical margin of the filling may be almost correctly adapted to the cavity's margin as soon as the filling is inserted, especially if amalgam is used at the cervical margin, less force being needed to drive this home, and hence less liability of forcing away the matrix; but in most cases if a pointed instrument is introduced the rough and ragged edge which drives dentists to despair can be detected, and that even after disks or emery cloth have been run over it. In this case something must be inserted to reduce this rough edge, and most files are entirely too large. We recommend the use of properly shaped lancets. One made from a common small steel spatula by somewhat shortening and narrowing the blade, and giving it a knife edge at its end, will serve the purpose fairly well in a great number of cases.

CORRESPONDENCE.

"JUMPING THE BITE."

To the Editor of the Dental Cosmos:

Sir,—In the July number of the Dental Cosmos Dr. Talbot offers me one hundred dollars to prove (under conditions which he names) that my statements in relation to "jumping the b te" are true.

After more than twenty years of uninterrupted success, it would be entirely beneath my dignity to enter into a formal contest simply to prove to Dr. Talbot that I have not been guilty of either imposture or falsehood.

If the operation were entirely new, had never been accomplished by others, and was opposed to all anatomical and physiological research, there might be an excuse for Dr. Talbot's skepticism based upon *his* inability to do it; but as it is not at all likely that any one else of intelligence shares his views, I see no more reason at this late day to attempt to convince *him* than to change the opinions of the Rev. Jasper, who still insists that "the sun do move."

As the munificent offer of one hundred dollars is also open to "any other dentist," it is possible that some one whose time is less valuable than mine may accept the proposal, but it would be a small fee to receive unless the patient also remunerated him.

Challenges of this sort, with a money forfeit, savor too much of newspaper advertising schemes for the purpose of increasing their circulation, and should have no place in professional intercourse.

Norman W. Kingsley.

PROCEEDINGS OF DENTAL SOCIETIES.

AMERICAN MEDICAL ASSOCIATION—SECTION OF ORAL AND DENTAL SURGERY.

The forty-third annual meeting of the American Medical Association was held in Detroit, Mich., June 7, 8, 9, and 10. Following is a report of the meeting of the section, with abstracts of papers read and discussion thereon:

First Day, June 7.

The section met at 3 p.m. in Fraternal Hall, Detroit; Dr. J. Taft, chairman of the section, in the chair. In his annual address Dr. Taft called the attention of the members to the advances in recent times of the profession of dentistry. As one of the present signs of progress he mentioned the fact that the profession will no longer accept a theory of disease or a remedy on the judgment of any one man, or of several men, but everything is widely tested before it is accepted. Then there is a large feeling of community of interest among dentists in all that pertains to the principles and practice of dentistry, and of intolerance toward any who would withhold from others new or valuable facts that may come into his possession.

The views in regard to the education and training necessary for a dentist are undergoing a radical change, and there are indications of an earnest desire for something better than has been heretofore offered ; and in answer to this change of view very pronounced and significant changes in educational methods are being tested in the way of more thorough clinical, technical, and mechanical demonstrations and careful manual training of the student.

The favor with which the union with dental colleges is now received by medical and other institutions of learning is prophetic of great things in the future. It shows a better appreciation of dentistry by the medical profession. Physicians have come to recognize dentistry as a branch of the great healing art.

In referring to the increasing number of dental graduates, Dr. Taft said that in view of the fact that as the public becomes better informed and more intelligent as to the need and great value of the dentist's services the demand for good dentists will be much larger, and there is no present reason to fear an over-supply.

In regard to the preliminary requirements of students, he said that in nearly every case before a young man undertakes the study of dentistry he asks some dentist for advice, who, if he is acquainted with the young man, can better judge whether he has moral, mental, physical, and educational fitness for the profession than can be ascertained by a preliminary examination by a college faculty ; and to a great extent on this adviser rests the responsibility of the admission to the profession of fit or unfit men. More attention should be given to a broad, liberal education and culture. A breadth and depth of culture gives power and strength,—makes one better in his profession, and gives him a better standing and influence with his fellows.

In closing, Dr. Taft deplored the fact that the dependence of all dental colleges for support upon the fees from students made the getting of students of such paramount importance that there perhaps were cases of unfit persons being admitted for the sake of the fee, and suggested that unless dental colleges were endowed with funds for their support, or were connected with institutions which were so endowed, this danger would always exist.

A paper was read on "Personal Experiences in Empyema of the Maxillary Sinus," by Dr. H. Gradle, of Chicago. An abstract follows :

The writer considered the diagnosis as very difficult in the less pronounced but not infrequent cases, especially when the empyema is of nasal origin and there is no history of dental infection. The only constant symptom is discharge from the nose. This is indicative of suppuration of one of the sinuses if one-sided. But the disease may also be bilateral. If the pus can be seen issuing from underneath the middle turbinated bone, the suppuration is either in the frontal or the maxillary sinus. The pus is always fetid if the infection is of dental origin, but not necessarily so if due to the extension of nasal disease.

The writer has not been able to rely upon translumination of the bone for diagnostic purposes.

The only way to confirm the diagnosis is by puncture. If on account of sound teeth there is no room in the alveolar process, the puncture can be easily made through the canine fossa. But care must be taken to work under the mucous membrane where it is firmly attached to the gums, since irritation of the loose tissue of the cheek causes unpleasant swelling. If pus does not come upon aspiration, the cavity should be irrigated with sterile salt solution, in order to remove the pus through the nasal opening. Sometimes pus is not formed at the time, but follows the next day,—not from fresh infection, but on account of the existence of septa in the antrum.

While there is no symptom characteristically indicative of disease of the antrum except discharge from the nose, the infection may make its presence known by nasal irritation and obstruction, headaches, neuralgic pains, and less frequently disturbances of the eye or ears.

Suppuration of the antrum of nasal origin can heal spontaneously. In one instance this was demonstrated by the negative result of a second exploration six months after a primary puncture, the after-treatment of which had not been kept up. There is no reason to think, however, that antral suppuration of dental origin will heal without operation. Recent cases can heal in three to six weeks after drainage is established. Long-standing disease, however, may require months or over a year for a cure. In one instance the author found the decay due to a hypertrophied condition of the mucous membrane lining the antrum, which was successfully curetted. The opening, either through the alveolar process or the canine fossa, should be made as large as possible. When the discharge begins to diminish, irrigation is no longer necessary, but the daily insufflation of boracic acid or other soluble antiseptic powders hastens the healing.

Discussion.

Dr. M. H. Fletcher said that he had had but little experience in cases of this kind, but related the case of one of his patients whom he took to a specialist for operation. The operator attempted to make an opening into the antrum through the canine fossa with a chisel, and found it so difficult that the patient was exhausted before an entrance was effected, and had to return home for rest. Coming back another day to have the operation completed, entrance was effected with a drill. The specialist said there had been a very unusual thickness of the bone ; and Dr. Fletcher wished to ask whether such trouble was often found.

Dr. Gradle said that while there were variations in the thickness of the bone, it was rarely that any serious trouble was found.

Dr. E. S. Talbot said he had seen a case similar to the one mentioned by Dr. Fletcher, where the dentist had drilled into the nasal cavity instead of into the antrum. In many cases the antrum does not extend forward to the canine fossa, and if it does it will not extend more than one-fourth to one-half inch back of the third molar. The operator in the case of Dr. Fletcher may have pierced the bone anterior to the antrum into the nasal cavity. Then, besides, the antrum is sometimes divided by septa of bone. He believes the better way is to drill into the lower part of the cavity. When this is done it is easy to wash out the antrum with antiseptics, as the drainage will be good and the trouble will be cured.

Dr. Fletcher asked if the peculiarity of the extent or position of the antrum was indicated in any way by the shape of the face. For instance, is the antrum farther back in a face with high cheek-bones, or is there any similar indication in regard to it?

Dr. Talbot said that as far as he knew there was nothing to indicate the extent or position of the antrum from the form or character of the bones of the face.

Dr. J. S. Marshall hoped that something would be said of antral disease following the grip. He had had four cases, in each of which there had been discharges into the nasal cavity of thick mucus,—not bad smelling, nor was it pus, but simply apparently an excess of mucus which had filled the cavity and was discharged through the nose. He thought it advisable to open into the antrum between the roots of the second and third molars, as this is usually the most dependent part of the cavity. He usually used, as an antiseptic, Thiersch's solution,—a bland antiseptic, and very satisfactory:

Boracic acid, 12 parts;
Salicylic acid, 4 parts;
Water, 1000 parts.

Dr. Talbot reported a case where, after the opening had been made, there was no immediate flow of pus; but such a flow did occur a day or two after the operation.

Dr. Gradle, in reply, stated that this had happened in a case of his where he had opened into the antrum, supposing a formation of pus there was responsible for a train of neuralgic troubles. He found no pus at the time of the operation, but in a day or two afterward there was a flow, which he was at first inclined to charge to infection from the instrument used in the operation; but the history of the case convinced him that the disease was the cause of the original trouble, as after the antrum was cleaned out the neuralgic troubles ceased. It is possible sometimes that there may be infection by the instrument, or if there be morbid fluid already present, piercing the wall and allowing the entrance of air might cause the formation of pus.

Dr. Taft asked Dr. Gradle what per cent. of diseases of the antrum were caused by diseased teeth.

Dr. Gradle thought between forty and fifty per cent.

Dr. Taft raised the question whether the micro-organisms in the pus from such positions as the antrum and the seat of a whitlow, for instance, where there was no opportunity for the microbes to obtain entrance from without, were the cause of the pus-formation, or whether they were merely an accompaniment, and asked where they came from and how they obtained access to such closed-in positions.

Dr. Gradle thought that the blood was possibly the vehicle which carried the microbes.

Dr. A. E. Baldwin said if this was so, and the blood carried these micro-organisms, there was certainly no safety in any measures which we could devise to keep them out of the system.

Dr. Clifford thought it better to pay more attention to systemic treatment in diseases of the antrum rather than to depend altogether on local treatment. The cause must in many cases be systemic, and we cannot reasonably expect to effect a permanent cure unless we remove the cause. He had had cases which he had relieved without opening into the antrum or establishing any drainage, by paying attention to remedial measures applied to the system at large.

The subject was passed.

In the absence of Dr. J. Smith Dodge, of New York, his paper was read by Dr. J. S. Marshall. It was entitled, "The Local and General in Dental Pathology." An abstract follows:

The whole field of pathology is divisible into the general and the local, and the opinions of pathologists have fluctuated many times in assigning the controlling power to the one or the other.

It was considered a great scientific advance when disease was pronounced an affection of "the humors," meaning all the liquids of the body, and therefore conceived as general with local manifestations. In our time the cellular pathology of Virchow has given a strong impulse again toward the more local conception; and bacteriology seemed for a while to convert all pathology into the local action of microbes. But the opinion grows that it is not so much the bacteria as their ptomaines, diffused by the hæmatic and lymphatic circulations, which cause disease, and this may bring us back again to the humoral theories, with the great advantage that we have discovered the *materies morbi*.

Dental pathology is so recent that it can hardly be said to have shared all these fluctuations; but its short history shows now the general and now the local view predominant.

The earliest modern dentists were first of all physicians, and they naturally viewed all affections of the teeth, not of mechanical origin, as symptomatic of general disorder. But when dental operations had been invented, the processes were so obviously local, both in causes and in results, that they fell speedily into the hands of men who were merely skilled mechanics; and the general relations of the art were almost neglected, or treated in the most empirical manner.

A great change resulted from the labors of Dr. Harris and the founding of the Baltimore College of Dental Surgery, which was the birth of dental education.

Such work as Harris's could not fail, and by slow degrees dentistry has come to its own. We no longer need to ransack the records of medicine for rare and doubtful cases which may show the reciprocal relations of teeth and nerve-centers, to prove that we deal with vital organs intimately associated with the general welfare of the system. Every division of the dental field demonstrates this abundantly.

The remote relations of the teeth which still need study are effected either by the nerves (whether the teeth are on the causative or resultant side) or by general cachexias not well understood.

There can be no doubt but that the constitution and the structure of the teeth partake of the general conditions of the system during the formative stage. This relation is a little obscured by the fact that the internal condition of teeth does not so readily fluctuate with changes of the general health as do most other tissues, because the process of nutrition and interstitial change is exceedingly slow. But during the formation of the teeth they are as easily influenced as other organs, and their subsequent condition, especially the difference often found in the same mouth between teeth of different periods, may frequently be accounted for by inquiring into the health of the child at the time each order of teeth was forming. A relation so easily established authorizes us to believe that a similar cause may some day be made out for more mysterious deficiencies of dental constitution, and pathological conditions may be thus explained from within for which no study of their surroundings shows any cause.

But the history of the teeth is not wholly determined by the circumstances of their formation. Many observations have proved that a slow circulation pervades the dentine, maintaining a correspondingly slow process of renewal and interstitial growth. This process certainly produces at times increased density, and the presumption almost amounts to certainty that it sometimes retrogrades and causes deterioration. The evidence of this is not easy to disentangle, but it grows in distinctness. It has long been observed that the teeth rapidly decay during or immediately after some attacks of prostrating sickness and some pregnancies. The cause usually assigned has been a pathological acidity of the buccal fluids, but it is now established by researches in bacteriology that, except at the very beginning, caries depends very little on external conditions; and therefore if the long-recognized effects of sickness and pregnancy are facts, some cause must exist which acts within the tooth. And such a cause does exist which is exactly in the line of our present study. Experiments made by the writer several years ago, but never published, showed that when decay occurs in fairly well-formed teeth, a zone of dentine immediately surrounding the cavity of decay has a higher specific gravity and yields more ash than a similar section from a sound side of the same tooth. This necessarily means a new deposit of lime-salts, apparently resulting from the irritation of decay. Now, such a deposit in itself is of course a local affair, but it implies a heightening of vital activity which must be traced back to nerve-centers. And it may well be assumed that besides the increase of density the increased vitality of the dentine hinders, *pro tanto*, the ravages of the bacteria. If this be the normal check upon decay, anything which so cripples the nerve-centers as to prevent this opposition leaves the tooth defenseless to its enemies, and destruction is far more rapid. Now to this failure of normal inhibition, rather than to any local cause, the quick decay accompanying disease and pregnancy must be ascribed.

Another field of quick decay reinforces this conclusion. In advanced life, when the general strength is impaired, teeth which have borne the strain of a lifetime are seen to give way suddenly to decay, so that in a few months there will be little left of the crown except the enamel, the dentine being decalcified in mass. Of course something must have happened to make this possible, and not alone general reasoning but the fact that these teeth are remarkably insensible under the excavator indicates that the nerves which supply them have almost ceased to work.

From all these considerations it seems fair to conclude that the decay of teeth is far from being a purely local matter, and is greatly determined by the nerve-centers by which the teeth are supplied.

Another branch of dental pathology which was long treated as merely local has come to appear as still more dependent upon general conditions,—the whole group of pericemental affections loosely classed as "Riggs's disease." Once every condition, from a slight marginal congestion to the suppurative inflammation of the whole membrane, was called the result of "tartar," and under this name were included both salivary calculus and the scales and stars of pericemental exudate which occur at all parts of an affected root. With this view of the cause, it could not be doubted that local treatment would cure the disease, and remedies warranted never to fail have been countless.

The fact is, however, that extreme deposits of salivary calculus, even masses as large as the tooth, are frequently found to have caused no worse trouble than a superficial inflammation, with some absorption of the gum, while deep-seated lesions of the most fatal kind occur in mouths which have been kept carefully clean. There is some cause farther back. Of course bacteria are invoked to explain it all, and they doubtless play a large and aggravating part. But they cannot explain why one mouth welcomes and another rejects them under the same visible conditions.

This writing has been interrupted to see a case which perfectly illustrates. Two molars have been driven apart by the blow of a wedge-shaped antagonist. At every meal food packs tightly against the intervening gum till it has receded far beyond the original level of the alveolus, forming a deep pocket between the teeth. Could any condition be more inviting to bacteria?—the deep protected nidus, the ever-renewed supply of food, never quite removed, the air and heat and moisture of the mouth?—and yet neither tooth shows the least sign of pericemental disease, and the depressed surface of the interdental gum is pale and healthy as the hard palate. Such cases not very infrequently prove that the whole is not stated when we have spoken of bacteria. The opinion of dentists is therefore inclining toward one or another constitutional state as the predisposing and sustaining cause of pericemental trouble. We do not yet know much about it. Perhaps gout or rheumatism is at the bottom of it; perhaps the condition, not well understood, which promotes nasal catarrh.

To these two conspicuous topics might be added odontalgia; but of this so much is superficially known, and so little profoundly, that it is hardly profitable for discussion. It is enough to say that the pains of the teeth are as frequently unaccountable as any others. The great majority, it is true, are due to local irritation, traceable if sufficient diligence is used. But the commonest perplexity of dental practice is that one may do so much in one mouth without painful sequels, while so small a portion of similar treatment in the next mouth will prove disastrous.

Nor has as much been anywhere said as might be of fugitive and unaccountable pains in the teeth. It often happens that the most searching examination discovers no local cause, and that nothing in the subsequent history throws any light on the matter. Of course such phenomena are to be referred to reflex nerve-action. The fifth pair present so many points of possible irritation, which passes so readily from one branch to another, that it would be strange indeed if the teeth did not often complain of disturbances quite remote from them.

Irregularities of position is another topic which might occupy us. When all the cases have been subtracted that can be explained by mechanical causes, a few remain which are partly ascribed to heredity and partly left without explanation. Further study of these will probably bring to light constitutional causes, perhaps reaching back to fœtal life. But the whole matter waits for patient investigation.

This review, then, while it shows very much yet to be accounted for, also shows that dental pathology is but a part of general pathology, and can by no means be studied alone.

And yet, when we turn to the dentist's daily practice we are surprised to find how much all this may be left out of account, how overwhelmingly the troubles which he treats admit of purely local explanation and cure. Indeed, the man who broods beside his operating chair over remote causes and turns his best attention to general remedies will, by and by, learn that he is a practical failure.

Let us next view the matter, therefore, from this side, and see to how great a degree dental pathology is local.

Nobody doubts that uncleanliness of the mouth promotes decay; and no theory of electro-chemical action and no discovery in bacteriology can shake this long-established result of observation. It is equally certain that the excavation and filling of any given cavity always retards, and frequently ends forever, the morbid process.

One cannot speak quite so forcibly of local causes in pericemental disease; and yet the results of local treatment are so often beneficial that local causes must play a large part, and the attempt to trace these diseases back wholly to constitutional causes must not only fail, but must interfere with the discovery of improved local treatment.

As for the local causes of odontalgia, they are very numerous, and sometimes so hidden that a diagnosis of remote causation is always to be looked on with suspicion and most rigorously questioned. And this, with a little less emphasis, is to be said of dental irregularities.

It might seem as if such a survey as has been made leaves the whole subject in confusion, and dentists must again divide into two opposing camps as in earlier days,—the medical dentists, and the operators. But this can never be. There is no room for such strife; and if it could be attempted the contest would be too unequal and would be speedily fought out. For all theories are subject to the test of facts; and the fact is that the reason of our existence as dentists, the warrant for the high estimation in which our art has finally come to stand, is the possibility of relieving dental troubles by local operations. No amount of diagnostic acumen or of scientific learning will make a man a successful dentist who cannot give prompt comfort and safe assurance of future usefulness to the mouths of his patients.

The writer hopes to be particularly understood as building, whether at the chair or in an essay, on the intelligently patient and skillful performance of dental operations as the corner-stone of dentistry. Whatever we may discover or invent, the day will not come in our time when there will not be ravages of past disease to repair and conditions of present disorder to cure.

It will, indeed, be a happy day for the science of the teeth if there ever arise men with the leisure and the learning necessary to work out the meaning of innumerable facts collected and recorded by practicing dentists. But no man can possibly do this who is tied to the operating chair; and the zeal that works without fee, combined with the fortune that makes this possible, does not yet seem to have fixed its attention on dental science.

Meanwhile, what can we who must do our daily tasks also do toward broadening the horizon of dentistry, toward hastening the happy day when dental disorders shall be rather prevented than cured?

Dentists have long nursed this hope, and the present paper aims to add another impulse in that direction.

It is no violent exercise of imagination to fancy the dentist of the future receiving a new patient. The chair, the mouth-glass, the probes will all be there, and the examination, tooth by tooth, as minute as now. There will follow a series of questions covering the ancestry, the habitual surroundings, the personal history and habits of the patient, and at last the dentist will give his judgment. "You have such and such defects of the teeth," he will say, "which will be duly corrected. You have this or that constitutional weakness which has caused or promoted your dental troubles; or your diet, your occupation, your habits, are at fault, and it will be necessary to make changes thus and thus." After six months, perhaps, the patient will return, the examination will be repeated, the regimen approved or changed as results may have appeared. In a few months or years the patient will have ceased to have any further dental disasters beyond the inevitable wear and tear of hard-used organs; and after two or three generations dental disorders will rank with pulmonary or ocular diseases,—always possible, but commonly escaped.

No thoughtful dentist will say the picture is too flattering; yet how delightful it is! And how are we to realize it? By holding fast the conviction that behind the local cause and effect there are powerful general causes; that these are not simple and manifest, but difficult to trace and much interwoven; and that, therefore, they are not to be discovered by catching up some theory of phosphates, or rheumatism, or bacteria, but by the most patient accumulation and comparison of cases which now and then give some valuable hint, and a slow deduction of broad facts and general principles. As it will take several generations of patients, properly guided, to produce the dentition of the future, so it will take several generations of educated, diligent dentists to acquire the wisdom which may guide.

Perhaps it will seem a scanty outcome of so many words; but the conclusion of the whole matter is this: Besides the patient work of local treatment and repair, from which we cannot escape, we must vigilantly watch and search for local causes; we must question and compare unweariedly; we must nurse a wholesome suspicion of theories which explain too easily or too much; and we must count it a life well spent if, besides innumerable daily ministrations of comfort to our patients, we can at last contribute to our profession one step forward in a knowledge of the fundamental causes of dental pathology.

Discussion.

Dr. Talbot agreed with the essayist that the diseases of the teeth were often intimately connected with diseases of the system, and instanced two cases of patients suffering with pyorrhea alveolaris who had been under his care, but for whom he had not found it possible to effect any permanent good. The disease of the teeth affects the general system, and the disease of the system affects the teeth. In both cases he had advised long ago that the teeth should all be extracted and artificial dentures inserted in their place. All the teeth are sound, and the patients would not consent to lose them, though it is the only course by which they can expect to enjoy life. The patients have now become so physically run down that it is scarcely possible for them to get from their homes to their offices. They were of gouty diathesis, and when they had excess of acid in the urine the teeth would be surrounded with pus, and so loose that they scarcely could be kept in their sockets. The age of the patients was about thirty-five to forty-two years, and the trouble had been running on for fifteen or more years.

To understand such cases it is necessary to study the whole systemic condition. So also in neuralgia we often find the cause in a distant part of the body; for instance, it may be in the uterus, it may be from dyspepsia or a gouty or rheumatic condition.

Dr. Marshall said that one of the patients of whom Dr. Talbot spoke had come into his hands. He first looked for constitutional cause for the trouble. There was no tartar on the teeth. He made up his mind the patient was gouty, and upon examining the urine found a large excess of uric acid. Upon inquiring into his habits it was learned that he was an excessive meat-eater. Being advised to limit himself in this regard he improved, but he will not give up his meat to the extent necessary to avoid the trouble, so now and then he returns for local treatment, which is given, and he is told to return the next day, but he never does. When he has the severe suppuration there is always excess of uric acid; no doubt the excess of uric acid or the gouty condition affects the suppuration as a cause.

Subject passed, and section adjourned till 2.30 P.M. next day.

(To be continued)

FIRST DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

THE First District Dental Society of the State of New York held a regular monthly meeting, Tuesday evening, March 8, 1892, at the New York Academy of Medicine, No. 17 West Forty-third street; the vice-president, Dr. V. H. Jackson, in the chair.

Dr. Louis C. Le Roy, of the Clinic Committee, read the following

CLINIC REPORT.

A stated clinic was held this afternoon at the depot of The S. S. White Dental Manufacturing Company, in the Lincoln Building, Nos. 1 and 3 Union Square. Ninety-one dentists were in attendance. Dr. G. Lenox Curtis presented the following cases in oral surgery:

1. Dr. G. Presented with purulent and cystic antrum; was in great pain, and suffering from pyæmia. The history of the case given was that the diseased condition was first noticed about eight years ago, and the cause was attributed to abscessed teeth. For several years an obstinate offensive catarrhal discharge was apparent. The nares on the affected side was closed, and nearly filled on the opposite side, the result of which was mouth-breathing. The roots of the second biscupid and molar were found to be abscessed. The roots of the molar were disinfected and filled. The bicuspid root was removed, and the process which had surrounded it, and the entire floor of the antrum found to be necrosed. The antrum was nearly filled with pus, cysts, and granulations. The disease was removed with burs and

curettes. No pain followed the operation, and three weeks afterward the case was dismissed as cured.

2. Alveolotomy. The root was permanently filled. The necrosed bone and abscess-sac was burred away and the *débris* washed out. No further treatment was given. Three weeks afterward the case was found to be healed

3. Fracture of inferior maxilla. Patient, age forty-four. Cause due to an injury. Seat of fracture at the angle of the jaw. Much pain and considerable hemorrhage, due to laceration of nerve and vessels, continued for several days. The oral teeth having been lost, the patient could readily take food. The teeth were articulated, and the jaws bound closely together by bandage.

4. Fracture of inferior maxilla. Patient, age twenty. Cause, a blow. Seat of fracture between left central incisor and cuspid. There was a displacement of a quarter of an inch on the right side. No teeth having been lost, an interdental splint was made of vulcanite and adjusted, the parts being held in position by bandages. The patient was fed through an opening in the splint.

These operations were successful, and entirely satisfactory to the patients and those who saw them.

Dr. H. H. Sisson operated upon the second upper bicuspid and first molar on the left side in the mouth of a young lady, filling cavities in the crowns of same with Rowan's extra plastic gold cylinders. The gold used required no annealing, and appeared to work very satisfactorily. Dr. Sisson inserted three excellent fillings,—two crown cavities in the molar united through the median fissure, and a crown cavity in the bicuspid. Hand-pluggers, and a hand-mallet operated by an assistant, were used. . . . Dr. C. S. Wiggins, of Hornellsville, N. Y., was present (although not announced on the program), and exhibited his system of crown- and bridge-work (the details of which appear in the DENTAL COSMOS of August, 1891). The crowns shown were an evidence of skillful manipulation and fine workmanship, and received general commendation. . . . Dr. W. D. Tenison showed a case of thumb-sucking, having both patient and models. The patient is a young miss of ten years, who is just being corrected of the habit. She seems ordinarily to breathe through the nose, although there was some claim that a tendency to breathe through the mouth also existed. Opinions as to treatment were diverse, some claiming that to bandage by chin-pieces and skull-cap would bring about the result desired. The prevailing opinion was that nothing be done at present in the case, for reasons evidenced in the models, the upper second temporary molars being still in place and the twelfth-year molars not having erupted. The lower second deciduous molars have been extracted, but there are no indications of the appearance of the second bicuspids. The lower twelfth-year molars have erupted on one side only. There appears to be some tendency toward a V-shaped upper arch. The points of occlusion are on molar teeth, the anterior teeth being a quarter of an inch apart when mouth is closed. . . . Bryan, Enholm & Co. exhibited a four-cell battery, with a pedal switch giving reversible and instantaneous stop to motion; also, comprised with battery, a switch for regulating speed. The advantages claimed by the manufacturers for their electric apparatus as applied to the dental engine are instant stop, instant reversal, full power at low speeds, and noiseless running. The battery is in a condensed form, and it is claimed that for running the S. S. White Electric Mallet two or three cells at most are sufficient where less satisfactory results are obtained with double the number of other makes. . . . . "Crystal Mat" gold was shown, and although no operations were performed with it, the excellent working qualities of this form of gold were vouched for by several who had used it.

F. R. Sturgis, M.D., of New York, read a paper on the "Distinctive Character of Syphilitic Teeth." *

Dr. Ottolengui read a paper by Arthur C. Hugenschmidt, M.D., D.D.S., of Paris, France, the title of which was "Syphilis of the Mouth and Teeth."† B. C. NASH, D.D.S., *Secretary.*

OKLAHOMA DENTAL ASSOCIATION.

THE annual meeting of the Oklahoma Dental Association was held at Oklahoma City, May 3, 1892.

The following officers were elected for the ensuing year: J. S. Nicholson, president, El Reno; W. E. Furrow, vice-president, Guthrie; Mrs. Laura Davis, secretary, Oklahoma City; J. B. Calmes, treasurer, Guthrie; J. B. Calmes, J. Ellard, and W. J. Broadfoot, trustees; M. L. McCon, W. J. Broadfoot, and J. Ellard, membership committee; W. E. Furrow, E. Ellard, and D. D. Slocum, publication committee; Mrs. Laura Davis, W. J. Broadfoot, and M. L. McCon, executive committee.

Dr. Henry Davis, of Oklahoma City, was chosen delegate to the World's Columbian Dental Congress at Chicago in 1893.

The greater part of the afternoon was spent in discussing the advisability of incorporating the association. It was finally decided to incorporate at once. Drs. D. D. Slocum, J. W. Broadfoot, and W. E. Furrow were appointed to look after the matter.

Dr. M. L. McCon, of Purcell, read a very interesting paper on "Odontalgia: Its Causes and Treatment."

The association adjourned to meet at Guthrie the second Tuesday in November. LAURA DAVIS, *Secretary*, Oklahoma City.

CONNECTICUT STATE DENTAL ASSOCIATION.

THE twenty-eighth annual meeting of the Connecticut State Dental Association was held at Hartford, Conn., May 16, 1892.

The following officers were elected for the ensuing year: E. S. Gaylord, president; C. C. Baker, vice-president; George L. Parmele, secretary; Joseph H. Smith, treasurer; James McManus, Wm. H. Rider, and Daniel A. Jones, executive committee.

A committee, consisting of Dr. James McManus, Wm. J. Rider, and Joseph H. Smith, was appointed to express the sentiments of the association regarding the death of Dr. Daniel Dwyer, which occurred on November 7, 1891. Dr. Dwyer was characterized as a "hard-working, conscientious dentist, and a warm-hearted, honest man." He was a graduate of the Baltimore College of Dental Surgery.

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* Dr. Sturgis's paper did not come into possession of the society, as by special arrangement with the executive committee it was retained by the author for publication elsewhere.

† This paper will be printed in full in the September number of the DENTAL COSMOS.

Geo. L. Parmele, *Secretary*, Hartford.

LEBANON VALLEY DENTAL ASSOCIATION.

At the meeting of the Lebanon Valley Dental Association, May 18, 1892, at Ashland, Pa., the following officers were elected for the ensuing year: C. S. W. Schomo, president; Charles W. Scholl, vice-president; J. H. Herbine, secretary; Richard Woll, corresponding secretary; E. P. Kremer, C. B. Wagner, and H. Zimmerman, executive committee.

The next meeting of the association will be held at Wernersville, on the third Tuesday in May, 1893.

J. H. Herbine, *Secretary*, Pottsville, Pa.

CONNECTICUT VALLEY DENTAL SOCIETY.

At the twenty-eighth annual meeting of the Connecticut Valley Dental Society, held at Greenfield, Mass., June 1, 2, and 3, 1892, the following officers were elected for the ensuing year:

F. W. Williams, Greenfield, Mass., president; W. H. Rider, Danbury, Conn., W. O. Barrett, Ware, Mass., vice-presidents; Geo. A. Maxfield, Holyoke, Mass., secretary; A. J. Cutting, Southington, Conn., assistant secretary; F. R. Rice, North Adams, Mass., treasurer.

Geo. A. Maxfield, D.D.S., *Secretary*.

THE DENTAL ASSOCIATION OF NEW SOUTH WALES.

As the result of agitation on the subject of organization, a mass meeting of the dental surgeons of New South Wales was held in Sydney, May 10, 1892, at which it was decided to form a dental association. The name chosen was "The Dental Association of New South Wales," and it was decided to place its affairs in the hands of a board, consisting of a president, two vice-presidents, a treasurer, a secretary, and a committee of seven. The following were elected officers: Dr. A. Burne, president; Messrs. C. Hodgson and H. Patterson, vice-presidents; Dr. W. T. Halstead, treasurer; Mr. H. Taylor, secretary; Drs. A. E. Lester, A. Hinder, E. R. Magnus, Messrs. H. Peach, S. Chaim, C. C. Marshall, and H. Lowe, committee.

DENTAL SOCIETY ANNOUNCEMENTS.

VIRGINIA STATE DENTAL ASSOCIATION.

The twenty-third annual session of the Virginia State Dental Association will be held at the Rockbridge Alum Springs, beginning Tuesday, August 30, 1892, at 10 o'clock A.M. All members of the profession are invited to attend and will receive a cordial welcome.

W. L. Bacon, D.D.S., *Ch. Exec. Com.*, Lexington, Va.

The Virginia State Board of Dental Examiners will meet at the place and date named above, at 9 o'clock A.M., to examine candidates intending to practice dentistry in Virginia. Only graduates of reputable dental colleges are entitled to examination.

W. E. NORRIS, *Secretary.*

EDITORIAL.

ORGANIZATION OF THE WOMEN'S DENTAL ASSOCIATION OF THE UNITED STATES.

IT is probable that in Philadelphia more women are engaged in the practice of dentistry than in any other American city. Certainly, Philadelphia dental colleges were among the first to encourage women to adopt this profession. It is therefore fitting that the movement to organize a national Women's Dental Association should originate in Philadelphia, and that its office should be located here.

The Women's Dental Association of the United States was organized March 19, 1892, by the adoption of a constitution and by-laws, and necessary steps have been taken to procure a charter under the laws of Pennsylvania. Its purpose is to promote the professional interests of its members, through the advantages which association confers. Stated meetings provide opportunity for communications, comparison of professional experiences, and determination of the value of new discoveries or applied processes. It is intended to maintain a standard of qualification for membership sufficiently high to insure, at all times, a thoroughly representative organization.

Prominent among those interested in this movement are Dr. Edith L. Brown, Dr. Elizabeth A. Davis, Dr. A. T. Focht, Dr. B. M. Jarrett, Dr. Maria Lasser, Dr. Anna K. Lettenmeier, Dr. Hannah M. Miller, Dr. Martha B. Moore, Dr. Mary H. Stilwell, Dr. Margaret Taylor, Dr. W. W. Wyeth, and Dr. Eliza Yerkes, of this city ; Dr. A. Ireland and Dr. Olga Neymann, of New York ; Dr. F. E. Hoopes, of Baltimore ; Dr. Edith Jewell, of Washington, D. C. ; Dr. A. F. Reynolds, of Boston ; and Dr. E. L. Benham, of Chicago.

The constitution provides for active and associate membership. Active members are elected from practitioners of dentistry who are graduates of recognized colleges, associate members from those whose services to the dental profession entitle them to such recognition.

Applications for membership are to be made to the recording secretary, by whom they are reported to the executive committee for consideration. If approved by the executive committee, they are brought before the association. A two-thirds vote is necessary to election.

Officers must be active members. The dues are an initiation fee of one dollar, and thereafter one dollar annually.

The officers of the association are: Mary H. Stilwell, president; Anna K. Lettenmeier, vice-president; Maria Lasser, treasurer; Eliza Yerkes, recording secretary, 4004 Chestnut street, Philadelphia; A. T. Focht, corresponding secretary; Elizabeth A. Davis, Bertha M. Jarrett, and Hannah M. Miller, executive committee.

While the nucleus of original members was composed of Philadelphians, acceptances of membership are steadily being received from leading women dentists of other cities throughout the country, and it is evident that in a short time this organization will hold an important relation to the practice of dentistry in the United States.

Many of its members are alumnæ of dental colleges and connected with various dental associations; but in the practice of dentistry by women, particularly in the inception of such practice, there are many ways in which this association cannot but be helpful to its members as women, both individually and collectively, by giving prominence and dignity to their position in the profession.

A decade since, a movement by the women members of a profession as far-reaching in probable consequences as this organization promises to be would have been regarded as exceptional. So rapid, however, has been the advance of women in technical careers, so permanently have they established their peerage, particularly in the profession of dentistry, that we welcome the advent of this new organization as we would that of any eminent body of men for a like purpose, and look forward confidently to its rapid extension and increasing usefulness.

The time has long since passed when the availability and fitness of woman for the practice of dentistry can be successfully questioned; and whatever may have been the differences of opinion as to her qualifications, both physical and mental, for this work when measured by the standard of male requirements, the fact remains that in dentistry, as in all branches of the great healing art, woman has found and successfully occupied a field of usefulness in which the sum total of those distinctively feminine qualities which go to make up an ideal womanhood have been invaluable, and are, after all, the essential factors of her success in these departments.

The question is not whether she is capable of doing her work from a man's standpoint and by masculine methods, but, Is there a sphere of usefulness in our profession which she can pursue and properly fill by virtue of her womanhood, and achieve success as woman? The affirmative of this has been demonstrated by experience, and we believe that the ennobling influence of her activities in dentistry will be increasingly felt in the course of time by the whole dental profession.

The announcement of the formation of a dental organization devoted solely to the interests of women practitioners may perhaps raise a question as to its expediency, or more definitely, What need is there for an association of women dentists when so many dental organizations of men are open to them? The need is probably an outgrowth of the numerical differences involved more than from any other cause. Women practitioners being in such a small minority when compared with the whole body of dentists, they must naturally feel the need, both socially and professionally, of an organization wherein their special claims and field of work shall be the first matters for consideration; but if such is the case, as it doubtless is, any considerable relative increase in the number of women practitioners of dentistry must work a corresponding tendency toward the fusion of their work with that of the older associations of our profession.

In the mean time, we offer our sincere sympathy and best wishes for the success of the new organization, bespeaking for it the hearty coöperation and support of the entire dental profession; and we shall hope to soon have the satisfaction of presenting our readers with the record of its work in the cause of professional advancement.

THAT CENSUS CLASSIFICATION.

As announced last month, a representative committee of dentists proceeded to Washington to protest against the classification of dentists for census purposes by the Willcox bill. The committee presented the following proviso to be attached to the bill:

> Provided, that nothing in this act shall be construed as authority to collect statistics from professional men, such as Lawyers, Physicians, and Dentists.

At a conference with the Senate committee having the matter in charge, the danger of causing the failure of the bill through lack of time to have it again considered by the House induced the withdrawal of the amendment, on the Superintendent of the Census signing the following agreement:

> WASHINGTON, June 27, 1892.
>
> The Supt. of the Census agrees with the representatives of the Dental Associations present at a meeting of the Senate Committee on the Census to carry out the spirit and purpose of the amendment presented by the said associations at the meeting, and which appears in the paper marked "A" herewith attached.
>
> ROBERT P. PORTER, *Supt. of Census.*

This agreement practically restores the classification of 1880, provided it can be maintained. We regret that the agitation was not begun earlier, so that the bill could have been amended to carry the exemption, as it is not clear to us that dentists are technically freed by this agreement. However, as it appears to have been the only resource under the circumstances, we shall hope that the justice of the position it concedes will preserve it against any possible assault.

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

The abbreviations of titles used are those common to bibliographical work, and will, it is presumed, be readily comprehended by any one familiar with dental or scientific publications. Any explanation will be gladly furnished by the compiler. A star (*) indicates a Thesis.

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LIST OF UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING JUNE, 1892.

June 7.—No. 476,496, to W. M. Speakman. Hand-piece.
" " No. 476,605, to Robert Brewster. Artificial tooth.
June 14.—No. 476,896, to A. Rader. Aluminum solder.
" " No. 476,944, to R. M. Hunter. Dental engine.
" " No. 477,076, to H. E. Spencer. Engine attachment.
June 21.—No. 477,197, to J. A. Barker. Head-rest.
" " No. 477,225, to Carl Rauhe. Dental drill.
" " No. 477,411, to A. J. Harris. Dental plugger.
" " No. 477,546, to W. S. How. Rubber-dam clamp.
" " No. 477,619, to M. L. Bosworth. Dental plugger.
June 28.—No. 477,791, to W. E. Andrews. Reflector and tongue-guard.
" " No. 21,666, Design, to J. O. Kellar. Dental cabinet.

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ORIGINAL COMMUNICATIONS.

SYPHILIS OF THE MOUTH AND TEETH.

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(Read before the First District Dental Society, State of New York, March 8, 1892.)

SYPHILIS of the mouth is one of the most, if not the most, contagious diseases with which we specialists have to deal in our practice; and of the three principal venereal diseases existing—namely, syphilis, soft chancre or chancroid, and gonorrhœa—the first named is by far the most common which we are apt to encounter, and this is easily explained. One of the most frequent causes of contamination of the mouth by the first of the above-named diseases is the direct contact of the mouth with the source of infection in one of the opposite sex. It is therefore easily understood, when one is familiar with the external lesions of both gonorrhœa and soft chancre, that neither of these two diseases can pass unnoticed by either of the parties brought in contact; syphilis, on the other hand, presents itself in many cases in such an innocent way that the lesion is often overlooked, and therefore may contaminate any part of the human organism that is brought in contact with it.

Yet gonorrhœal inflammations of the mouth have been observed by most trustworthy medical practitioners. Rodet has observed eight cases which appeared to him to be gonorrhœa of the mouth, the disease localizing itself on the soft palate and lips; the mucous membrane presented a red, villous appearance. No secretion was found, but on scraping the surface of the affected parts he found a certain whitish material, which very much resembled muco-pus. These lesions were also accompanied by a persistent pain, which could not be relieved by the ordinary means, and only changed after the use of nitrate of silver. Another author, Baumès, also observed a workman who acknowledged having applied his lips to the sexual parts of a woman suffering from gonorrhœa; this resulted in an intense inflammation of his lower lip, which presented several white spots, with a very small quantity of purulent discharge. Rollet also observed several cases of similar buccal inflammations, which the patients admitted having brought on in the same manner. Some ten years ago I met with a similar case at the hospital, in a young man aged twenty-four, who presented a very marked inflammation of the buccal cavity, accompanied with very great smarting pain, which increased every time he took the least irritating liquid or solid food; there was also an extensive inflammation of the gums at the necks of the teeth, accompanied by purulent discharge. This young man admitted having been exposed in the same way to contact with a rather doubtful woman, and twenty-four hours later began to suffer from his mouth.

The non-infectious or soft chancre, which is commonly met with in the genital regions, is extremely rare in the mouth. This is due to its ugly appearance, its great size, and its suppuration, which may become very profuse; it is also more sensitive and gives more pain;—facts which call the attention of the affected person to the disease, and hence would naturally prevent her from allowing another person to become affected; yet these chancres have been several times met with.

The celebrated Ricord in the early period of his life believed in the identity of soft and syphilitic chancres, thinking that soft chancres only could be found below the thorax, while all other chancres occurring above that region became indurated chancres, whether derived from soft or hard chancres; and in 1831, to verify his belief, he made several inoculations in the mouth. By using virus derived from soft chancres he produced four chancres of the lips and two of the pharynx in women, and three labial chancres and one pharyngeal in men; but none of them became indurated nor syphilitic, as a matter of course. Notwithstanding the results of his experiments, Ricord still believed that soft chancres of the mouth were syphilitic, yet not so infectious as in other regions, as they were not followed by constitutional symptoms.

The first instance of the record of syphilitic lesions of the mouth dates back to the sixteenth century, when Botal observed a syphilitic chancre of the mouth. About the same time Brasavola called attention to the syphilitic chancres met with in children, which had been given to them by their nurses. From that time on, Ambrose Paré, Fallope, etc., all observed the buccal chancre.

Before entering upon the mode of transmission of syphilis, a few elementary facts pertaining to this disease will not be out of place:

A syphilitic or indurated chancre is always, except in hereditary syphilis, the first lesion of syphilis, and it indicates the point of introduction of the virus into the system. This initial lesion may not be found at once, but it is present somewhere; it may begin in the œsophagus, perhaps even in the stomach, or again may occur and locate itself in the rectum, when irregular connections occur, or in the uterine cavity, wholly out of sight; but it still is or has been in existence, perhaps without having given rise to any serious symptoms, and it is then only when secondary manifestations of the skin and mucous membrane appear that the disease first indicates its presence. Again, syphilis can only be communicated by a true hard syphilitic chancre, and never by a soft one. In the mouth it is oftener transmitted by the *secondary manifestations*, such as the mucous patches, and in such cases it is *not* communicated as a mucous patch, but as a *true primary syphilitic chancre.* Therefore, whether the active lesion is an indurated chancre or one of the secondary manifestations of the disease, only one kind of lesion can be produced, and that is a syphilitic chancre.

Should there be any question as to the real character of the primary lesion, should one be at a loss to diagnose between a hard and soft chancre, we have a criterium. If we inoculate the bearer of the syphilitic chancre with the secretions obtained from the lesion, say on his arm or thigh, no lesion whatever will occur, for the reason that the whole economy is already saturated with the poison, and the person is in this way vaccinated against any further syphilitic lesion. The same immunity exists among persons who have already had syphilis. They never can take syphilis a second time; sexual connection with the most infected person would not bring on a syphilitic sore; yet if that vaccinated person came in contact with a soft chancre, which is not constitutionally infectious, she can take the disease and have a soft chancre.

Hence the great difference between a soft chancre and a hard chancre is that a syphilitic chancre, which is constitutionally infectious, can only be communicated once; while a soft chancre, which does not infect the organism, can occur many times on the same person. Again, if one takes pus or the secretions of a soft chancre and inoculates it on the arm or thigh of the same person, there will certainly result a new chancre in the inoculated region, and often an ugly one. This experiment shows that the soft chancre, although by far the ugliest of the two, does not infect the organism, does not vaccinate the person against future exposure, and that by successive inoculations one could cover the person with soft chancres, by pus derived from their own local lesion, while such a result would be absolutely impossible with the virus obtained from a syphilitic sore.

As has just been stated, for a primary chancre to exist there must be a direct contact, a direct inoculation of the syphilitic virus into an eroded part of the mucous membrane or skin. There must be direct contact of the virus with the abraded surface.

Let us now review the different ways in which such contact can take place:

One of the most common causes, and probably the most common of syphilitic infections of the mouth, is the practice of kissing mouth against mouth; not only the mere contact of the lips, but the introduction of the tongue into the mouth, etc. Every one has in some part of the mouth, and especially on the lips, a more or less eroded surface; and if one of the parties is affected, not by the primary buccal chancre, which is very rare, but by secondary manifestations of the disease, such as mucous patches, which are very common and highly contagious, the opposite party will run great risks.

In a different order of idea, the friendly kiss exchanged in certain countries, between women especially, is done mouth against mouth, instead of the kissing of the cheek which is prevalent among people belonging to the Latin race. It is almost needless to say that the kissing mouth against mouth with a person outside one's own family, even if that person be an intimate friend, ought not to be indulged, as a person may be affected with secondary mucous patches on the borders of the lips or corners of the mouth, and yet be quite innocent of having the disease. It is not because a woman is a lady that she must be considered non-syphilitic. May not, as often has been the case, a correct woman be contaminated by her husband, who has caught the disease and brought it home to his better half? The wife herself for months may be absolutely ignorant of possessing a contagious disease, and can most innocently communicate it to her friends. Needless to say that it is reciprocal, and that the wife may get the disease on some irregular expedition and bring it home to her husband.

Children and small babies particularly are often affected by syphilitic patches around the mouth, especially at the corners of the mouth,—a fact which is well known by the number of nurses who have been contaminated by babies placed in their charge. How often do we not find people kissing on the mouth a baby they see for the first time? This practice of mouth-kissing of children ought also to be abandoned.

Suction, as still performed among the Israelites in certain countries after the operation of circumcision, has often been a great source of contamination. A diseased child presenting secondary sores on his penis contaminates the lips of the individual whose occupation it is to perform this operation, and afterwards all children for a period of months or years, operated on by the same person, will become syphilitic.

Having touched upon a religious rite, I cannot conscientiously overlook a mode of transmission of disease by the mouth which I consider most dangerous, and which, in our days, deserves a most careful study when the ease with which disease can be communicated has been clearly demonstrated. I refer to the danger of transmitting the syphilitic poison or virus by means of the communion-cup. It is well known that during the communion service the cup is passed from one person to another without being washed or even wiped,—this last process even would not be sufficient,—and that a number of persons mix not only their saliva, but any pathological secretions that may be located on the lips, by applying the inner surface of the lower lip against the cup. Suppose, for a moment, that among the communicants there should be a person affected with mucous patches of the lower lip or angle of the mouth, which is a very common locality for that lesion, and that, after this person has drunk, the cup be passed to a young lady who, the day previous, or even during the service preceding the communion, has pinched her lips with her teeth and torn away little fragments or small layers of mucous membrane,—what will be the result? Probably a contamination, and the young person will be syphilitic for her lifetime, and if she marries will transmit the disease to her offspring.

Optimists will say that this can never occur. I think one would find very few, if any, physicians, unless they have had syphilis already, who would dare to expose themselves by drinking with slightly eroded lips from a glass out of which a secondarily affected person with mucous patches of the lower lip had already drunk.

Another answer often given is, that church-going people do not have syphilis. To this assertion it is useless to reply. I would, however, refer any person desirous of further information on this particular subject to specialists in their respective countries.

Another religious rite consists in the kissing of certain relics.

Here, again, we have a fruitful source of contagion, although less marked than the preceding one, because in the above cases the whole inner surface of the lower lip is exposed, hence the chance for infection is greater if any erosions exist, while in the last the closed lips barely touch the relics.

Drinking out of one and the same bottle, as is often practiced by laborers, is another source of infection. Syphilis can also be transmitted by using dirty glasses while traveling; by the use of unclean forks, spoons, etc.; by the habit among common people of passing cigars from one person to another,—from a syphilitic person to a normal one; also in biting off a piece of chewing-tobacco, which is often done when several persons are together, the piece of tobacco being treated almost as family property; also by the use of a common pipe.

Syphilis has also been transmitted by smoking cigars which had been rolled and stuck together by a syphilitic person suffering from mucous patches of the mouth. Again, cigar-stump amateurs are liable to pay dear for a moment of happiness!

It has also been transmitted by taking candy out of one person's mouth and giving it to a child; also by the practice of entering a telegraph- or post-office, and after writing placing the penholder, there for common use, instinctively in one's mouth.

The transmission of syphilis by dental instruments has occurred, as well as by other surgical instruments. Not only must we be careful of our fingers, which are greatly exposed to contagion, especially in secondary manifestations, but as soon as we have recognized such a case we must be sure to wash our hands in an antiseptic sublimate solution $\frac{1}{1000}$ before taking another patient. Hunter has reported several cases of syphilis transmitted by the operation of transplanting teeth. This disease has likewise been communicated by a human bite. Drs. Rollet and Verneuil have observed such cases. Dr. Miller mentions several cases, among which a young lady of nineteen was bitten by her bridegroom, who communicated to her a chancre of the lip.

Saliva can be the vehicle of transmission of the syphilitic virus, but it is not infectious in itself; that is, if we should obtain saliva from this primarily affected person directly from Steno's duct or from the other salivary glands before it became mixed with the buccal secretions, we would find it non-infectious. If, however, we allow it to pass over a syphilitic ulcer, it will be mixed with secretions derived from that lesion, and will then become an infecting medium; and it is probably in this manner that the pharynx and tonsils become the seat of the chancre.

In glass-factories Rollet has mentioned the presence of syphilitic buccal chancres transmitted by the tubes passed from one man to the other for the purpose of blowing bottles.

Indurated chancre, situated on the border between the mucous membrane of the lips and outside skin, has been communicated on several occasions by the barber in the act of shaving. The use of a common blowpipe in a laboratory must not be indulged. The use of the common ice-water tumbler in hotels must be left aside.

The symptomatology of buccal syphilis is a complex one, as we meet in the mouth not only the primary lesion of the disease, but also the secondary and tertiary manifestations of the syphilitic poison.

The primary or indurated chancre does not make its appearance immediately after contact has taken place between the contaminating lesion and the abraded part. Several days are necessary, and rarely if ever, does it occur before the fourth or fifth day, the average being between the fifteenth and thirtieth days, whilst a soft chancre or chancroid begins almost the very next day after the contact. Its presence is often previously indicated by a redness of the parts, which will gradually become the seat of the ulceration. Whenever a chancre appears eight to ten days after contamination, the probabilities are of its being syphilitic.

The chancre may be found in almost any part of the buccal cavity, yet certain regions are more apt to become the seat of the inoculation, especially such parts as are more directly exposed to the contact of the part bearing the virus, such as the lips, the tongue, the tonsils. It is also said to be more frequently observed in females than in males, yet exactly the contrary has been stated by persons whose authority is no less than that of those who have expressed the first opinion. In children, new-born babies, the mouth is almost always the only part affected, and the only region through which the syphilitic poison enters the organism, as the only way by which a child can contract this disease is in the act of sucking the nipple of the nurse affected with secondary lesions.

As regards the relative frequency of the primary chancre in the mouth, Fournier, out of a total of eight hundred and twenty-four syphilitic chancres, found twelve chancres of the lips and six of the tongue; while as regards the localization of this lesion in the mouth, Rollet, out of thirty-nine syphilitic chancres of the mouth met with in men, found that twenty-nine occupied the lips, eight the tongue, one the gum on a level with a lower cuspid, and one on the inside of the cheek.

On the other hand, out of a total of twenty-eight indurated chancres met with in females, twenty chancres were found on one of the lips, two of the tongue, two of the uvula, and four were in other parts of the mouth.

In children the primary chancre almost always is found on some portion of the lips, and occupies the point which is constantly brought in contact with that part of the nipple which is the seat of the secondary lesion; that is, if the lesion is situated in the upper part of the base of the nipple, we must look for a lesion of the child on the upper lip. If the lesion occurs on the inferior aspect of the nipple, the under lip will be infected. If, during the act of sucking, the child be held very obliquely, the lesion will occupy the angles of the mouth, which is a common seat of the disease in children.

As I have just said with regard to the primary lesion, it is oftener situated on the lips; it may, however, occupy any part, and present itself sometimes in a very innocent manner. It may appear as a little pimple, a small, non-suppurating papule, which may remain stationary; the only changes observed being, a few days later, an induration of the base of the sore, which becomes hard and can be caught between the fingers, giving the sensation of a hard ring under the mucous membrane.

The chancre may occupy any part of the lip or angle of the mouth. If, however, it be situated at the junction of the mucous membrane of the lip and skin, we then observe a mixed sore; that is, the part belonging to the mucous membrane is ulcerated, grayish in color, while the portion on the skin is dried up, scaly, crusty, the whole being situated on a hard, indurated basis. This is one of the barber's chancres.

The chancre sometimes resembles a coffee-bean, having a more or less rounded appearance, with the fissure in the center of it.

It may, again, have the appearance of a dirty, grayish, ulcerated, circular sore, elevated above the surrounding parts, which may attain the size of a one-dollar gold piece or more, resting on an indurated basis. The chancre of the mouth as regards size is relatively larger than the one met with on the sexual organs. If it occupies the corners of the mouth, it is liable to increase in size, on account of persistent irritation due to continual motion of the lips, which prevents the healing of the ulcer.

Again, the chancre is not always single; it may be double and even manifold; for instance, if a chancre of one part of the upper lip exists, the corresponding part of the lower lip is liable to become involved ; or, if several abrasions exist on the lip at the time of the contamination, several local lesions may develop at the same time.

Induration around a labial chancre, especially around those innocent-looking lesions, is often wanting; and, according to Garselin, Belsousoff, etc., induration is oftener absent in cases of buccal chancres than in those appearing in other regions of the body.

The primary chancre of the lip can present such an appearance that it might be, and often has been, mistaken for epithelioma of the lip. The patient having been operated upon and the disease not recurring locally, the case was probably put down among the successful surgical removals of malignant tumors of the lips. Hence, whenever we meet with such an ugly-looking lesion, diagnosed as epithelioma, we must not forget that syphilitic poison manifests itself in many ways in the buccal cavity.

The chancre of the mouth, no matter in which part it is situated, is always accompanied by a more or less pronounced induration of the lymphatic glands of the sub-maxillary region. The glands attain different sizes, but are never very large. They are painless, and do not suppurate, as they have done in cases where a soft buccal chancre existed.

Similar lymphatic signs existing also in labial epithelioma indicate sufficiently what care we must take to arrive at a correct diagnosis of the two diseases, especially if the history given by the patient is a false one. We then have to wait and rely altogether on the appearance of the secondary manifestations of the disease.

On the tongue the chancre is less common ; but as regards appearance, resembles that of the lips.

It may have the form of a slightly eroded surface resembling aphtha, or it may grow to the size of a lentil, ulcerated, with irregular overhanging borders, and be situated on an indurated part. It may even attain a very large size. I have seen a case in which the ulcer was larger than a twenty-five-cent piece, occupying the anterior third of the upper part of the tongue. When the lesion is situated along the borders of the organ, where it is apt to be continuously brought in contact with the teeth and with any broken root, the lesion is liable to attain a very large size; and here again, in establishing our diagnosis, we must bear in mind the possibility of the presence of a lingual epithelioma, tuberculous or mechanical ulcer. Secondary symptoms, in many cases, will alone settle the question.

In the posterior region of the mouth the tonsils are the parts oftener affected, which is easily understood on account of the extreme irregularity which these organs present, they being filled with recesses in which a virus can remain undisturbed and develop itself at ease. The lesion, when benign in appearance, may be overlooked in this region. The patient may complain of sore throat, and as the pain is very slight during the first period, he does not pay great attention to it, and only applies for advice when the secondary phenomena break out. I have seen a case recently where a young man asked me to look at his throat, which had been sore for some weeks, without giving him, however, the slightest acute pain. On examination I found on the center of the left tonsil an irregularly developed sore, surrounded by a diffuse redness of the neighboring parts, and on inquiry I learned that he had exposed himself to the dangers of an inoculation. Several weeks later syphilides of the skin and mucous membrane indicated the nature of the apparently innocent sore throat.

If the sore is very large and ulcerated, and the induration great, the tonsil being therefore much increased in size, deglutition will become difficult, the throat at the same time being much inflamed. The pain may become very severe, and may be mistaken for acute tonsillitis. As I have stated, primary lesions of the gum, of the cheeks, and palate do occur, but are very rare; they present the same appearance as in other regions.

After a minimum term of six weeks up to six months and more, the secondary manifestations of the disease make their appearance, under the form of eruptions of the skin and corresponding lesions of the mucous membranes.

One of the very first manifestations which we may encounter is the syphilitic sore throat, where the pharynx, the tonsils, uvula, and soft palate appear of a bright red color, as if an acute inflammation of those parts were going to take place. It is an erythematous inflammation, and is often preceded by a general state of discomfort, tired feeling, nocturnal pains, and fever, which sometimes may run up very high. The way in which the patient speaks indicates that the process is not confined to the pharynx, but extends down into the larynx.

The next lesions, and the most common of all, are probably the mucous patches which are met with in the very early part of the secondary period. They are the result of an infiltration of the papillæ of the mucous membrane, covered by thickened epithelium, which forms these patches. They are opalescent, whitish, more or less regular patches, found in any region of the mouth, and which resemble spots such as are produced when we slightly touch the mucous membrane with carbolic-acid crystals. In their simplest form they do not rise above the surrounding surface, and are often mistaken for aphthous lesions by the careless observer.

If these mucous patches have existed for some time, they rise slightly above the level of the surrounding surface, due to an accumulation of lymphatic cells at the base, which gives them this hardened appearance.

They are found on the inner surface of the upper and lower lips, at the corners of the mouth, on the tonsils, where they are very common and resemble a herpetic angina ; they are found on the gums, cheeks, soft palate,—in fact, in every part of the buccal cavity. They are the most common lesions, and at the same time the most contagious.

At a later period these lesions, instead of remaining as superficial epithelial sheddings as they are at first, break down and suppurate. If several ulcerations are near to one another, they unite and become covered by a diphtheroid membrane.

When ulcerated mucous patches are isolated, one here and there in the buccal cavity, they are very liable to be mistaken for aphthous stomatitis.

Sometimes, and even commonly, where the mucous patches begin to make their appearance there usually is present some erythematous inflammation ; and these patches being so insignificant, a mistake is easily made, and the patient is sent away with a prescription for an ordinary pharyngitis.

On the tongue we find a peculiar kind of lesion. In the normal state the tongue is covered by innumerable very small papillæ. We often find, in the secondary period of syphilis, one or several spots, differing in size from a large pin's head to almost one-third of an inch in length, which look as if the lingual papillæ had been cleanly shaven. These were first noticed by Fournier. We also find fissures which divide mucous patches into one or several parts, erosions, and papules, and if these latter come in contact with the teeth they easily ulcerate.

The tongue is also the seat of hypertrophy, and indicates on its sides the forms of the teeth.

Hypertrophy of the tonsils is also one of the most common lesions of the secondary period, especially in lymphatic individuals. Both tonsils are usually involved, yet one only may be, while the other is the seat of a primary chancre, such as Morel Lavallée's case.

The use of tobacco ought to be suppressed during the evolution of the secondary phenomena, as it is liable to greatly aggravate the case ; and it is a well-known fact that non-smokers are much less subject to an extensive outbreak of mucous patches than those who smoke.

The mucous patches of the corners of the mouth are very troublesome and persistent, and cause, when cicatrizing, a retraction of the corners of the mouth. In hereditary syphilis in the new-born child no primary syphilitic lesion is ever found ; we observe only the secondary manifestations, and the mucous patches in particular.

Secondary syphilitic lesions, which at first sight very much resemble the lesions which we find in the tertiary period, are those ulcers, often solitary, which occupy either the hard or soft palate, and which strike the experienced practitioner as being true gummatous tumors of the palate. Their mode of development, however, is entirely different. While lesions belonging to the primary and secondary periods seem to involve only the exposed surfaces of the body, in general the skin and mucous membrane, these ulcers begin at the surface and extend downward, usually limiting their action to the derma; but if complications occur, if a general state of the organism of the patient favors it, if he is in a cachectic state, these ulcers, even those belonging to the secondary period, will extend, sometimes superficially assume a phagedenic appearance, forming an irregular ulcer with prolongations in different directions, attaining the size of a silver dollar. They may even go deeper and destroy the underlying connective tissue, and finally expose the bone if they are located in the palate, and bring about a limited necrosis of the bone, which later on may be eliminated and establish a communication between the nares and mouth by directly perforating the palate. Still, palatal perforations of secondary-period origin are rare, yet do occur if the constitution of the patient allows it. It has been a question sometimes whether these early serious lesions did not belong to those usually considered as belonging to the tertiary period ; we think not.

During the secondary stage, the patient may complain of nocturnal pains in his teeth and jaws, without being able to absolutely indicate the exact seat of the pain. The part immediately behind the central incisors, in the region of the anterior palatal foramen, I have known to be the seat of nocturnal pains of a certainly syphilitic origin. These pains may extend into the palate, and notwithstanding the fact that secondary manifestations of the parenchyma of the different tissues are not followed by actual lesions, I think that during the later stages of the disease the first-mentioned painful places may really become a point of less resistance, where later on more serious and lasting lesions will develop.

Bryant has seen a case of perforating ulcer of the palate in a one-month-old baby, who was suffering from hereditary syphilis ; yet such lesions are rare.

These extensive and ugly-looking ulcerations of the latter part of the secondary period present themselves often in young persons between the ages of eighteen and twenty-five years, in the region of the angle of the jaw, where the wisdom-teeth are located and have not yet erupted, and are the cause of some destruction of tissue. Syphilitic lesions of the mouth will develop in preference wherever irritation exists, and we all know the train of symptoms some wisdom-teeth are liable to give rise to when there is difficulty in the way of their eruption.

The lesions of the tertiary period, contrary to those shown during the last-considered period, do not begin on the external or internal surface of the body and work inward ; they, on the contrary, involve primarily the tissues situated below these surfaces, starting in the connective tissue and their derivates in the bones, and from them gradually working up to the surface, where they manifest their presence by an exposed ulceration.

In many syphilitic patients, during the beginning and development of the tertiary lesions we observe certain peculiar manifestations of the entire mucous membrane of the buccal cavity. We find here and there irregular whitish appearances of the mucous membrane, formed, according to Besnier, by a corneous transformation of the epithelial layer of that membrane. The mucous surface also looks as if it had been scraped, and then a whitish film had developed on it. The surface on which these manifestations are found is harder and tougher than the surrounding parts. They have been known under a variety of names : buccal psoriasis, buccal syphilitic leucoplasia, etc. There are also formed on the mucous membrane of the internal surface of the cheek certain irregular elevations, which correspond to the teeth and are produced by the contact of those organs with the cheek ; they are also covered by this whitish production. These lesions, although often found in syphilitic cases, are not exclusively manifestations of this disease, as they are also found under other conditions. These same changes are also very common on the tongue, where they may be detected in more or less regular places, which seem to be entirely deprived of the normal papillæ. They are at first red in appearance, and look as if the place had been scraped and then polished. Sometimes the tongue will be covered with a whitish deposit, the result of epithelial desquamation, giving it a mother-of-pearl-like appearance, situated on a hard surface. Several spots may also be found here and there on the lingual surface, but at times they form one continuous plaque occupying any portion of the tongue.

The tongue is also the seat of a peculiar hypertrophy. In this case it is very much enlarged,—one-third larger than its normal size,—is violet-red in appearance, and formed of innumerable elevations and depressions, deep fissures existing here and there. It has the appearance and redness of a raspberry, and with it often are associated syphilitic ulcerations of a gummatous origin.

Next we have those lesions which have been known as syphilitic tubercles, which are often found inside of the lips and the cheeks, on the tongue, tonsils, and pillars of the pharynx. They consist of little roundish tumors having the size of a large pea, which can easily be felt and are movable under the finger, for at that time only the connective tissue is involved, they having not yet worked their way to the surface.

In the lip, those small tubercles may increase in number to such an extent as to become the origin of certain syphilitic labial hypertrophies, which may attain two or three times the size of a normal lip. The tubercles which were felt at first are drowned in this mass of tissue and can no more be felt, for the surface then appears and feels very smooth, hard, and elastic. Sometimes this lesion, according to Tuffier, is followed by sclerosis. The lip gradually decreases in size, and atrophic changes occur which make it appear very thin. During this retrogressive change, one may again feel the small tubercles which were met with in the beginning, and these finally diminish.

Very extensive hypertrophy of the lips has also been noted in children suffering from hereditary syphilis.

These tubercles are very often found on the tongue, where they attain a comparatively large size, and sometimes are disseminated throughout the organ, forming what has been called "Ricord's hazel-nut tongue." These little tubercles may undergo ulcerations which differ from no other lingual ulcerations. They, however, are far less destructive than the lesions we shall now consider, and which form the most common tertiary lesions, namely, the gummatous syphilitic tumors.

Gummatous syphilitic tumors involve almost any tissues of the mouth; they are met with in the lips, the tonsils, soft and hard palate, the tongue, cheeks, etc.

They usually form globular tumors which have no defined membrane, as they are in intimate relation with the surrounding tissues, from which they cannot be separated. They are very different in size, varying from a large pea to a pigeon's egg, and surrounded by hard, indurated tissues.

These tumors may originate in the osseous tissue, in the periosteum, and in the muscular and connective tissues in general. They are indolent, give no pain; they increase gradually in size, and indicate their presence by the discomfort they produce. If no treatment has been instituted they begin to undergo degeneration at their central parts, this degeneration increasing gradually until the tumor opens on the surface, giving rise to an open ulcer. If we press the tumor between our fingers we can force out some sticky material, which comes out in a worm-like form and has the appearance of semi-solidified pus.

When situated on the lips, gummatous tumors, which usually in that region occupy the muscular tissue, have a great tendency to open outside the mouth instead of inside, and if the lesion is very extensive a large part of the lip may be destroyed, even extending to the nose, involving part of that organ if the upper lip be the seat of the disease.

Gummatous tumors of the tongue usually occupy the base of that organ, yet I must say that I have oftener met them on the lateral borders of the tongue, where they constitute tumors varying in size from a hazel-nut to a walnut. This location is due, I think, to the action of certain sharp teeth or roots, as in every case where I have seen that localization there were additional causes of irritation, such as those mentioned, which favored this seat of development; yet they have commonly been found on the upper surface of the organ. They usually begin by a small, rounded tumor resembling an enlarged papilla. They gradually increase in size, and being painless the patient pays no attention to them until they break, when he presents himself for advice. The lesion then looks like a boil. It is a hard tumor, having the size of a small walnut, in the center of which one finds a small ulceration, from which a gelatinous, pus-like substance can be pressed out. If, however, the lesion is more extensive, these characteristics will be lost, and we shall see only an open ulcer situated on a firm and hard basis. Here we are liable to make a mistake in diagnosis; and if no other lesions are found on any other part of the body, we must institute the specific treatment, which alone can remove our doubts.

We now come to the most important oral localization of these gummata, viz.: on the hard and soft palate.

The gummatous tumors of the hard and soft palate develop in the most insidious manner. If we are fortunate enough to witness the evolution of such cases,—and this we only can do if the patient has already applied to us for treatment on account of a similar lesion of any other part of his mouth,—we find on examination a small, roundish tumor, which is often in the median line of either soft or hard palate. The tumor slowly increases in size, no pain being present, with no redness of the part. It is hard at first, rolls under the finger, is not adherent to the mucous membrane. Under the influence of the iodide-of-potassium treatment this tumor will decrease in size and disappear; but if no such treatment be instituted the tumor will next involve the mucous membrane, will break down and form an ulcer, and if we introduce an exploring instrument we find denuded bone, which indicates that probably this lesion originated from the periosteum.

If the gummatous tumor is located in the soft palate, one will readily understand how easily perforation will take place in that region. Unfortunately, one can never say how soon such a lesion will ulcerate. We cannot say that it must attain a certain size, for gummata of the size of a small pea have ulcerated and established a communication between the nose and mouth ; and in other cases the gumma has become so large that the whole soft palate is destroyed, as we find it sometimes in non-syphilitic congenital cases.

For some years it has been proven that syphilitic perforations of the hard and soft palates are not due solely to gummata of their buccal aspect, but that very often the lesion first begins on the floor of the nares. The presence of such a lesion can only be demonstrated by a careful rhinoscopical examination, and this ought to be done whenever a syphilitic person presents with an ozena or bad odor from the nose, for a gummatous tumor of the floor of the nares in the region of the soft palate can easily be, and probably in the majority of cases is, followed by palatal perforation.

In some cases the lesion apparently runs a very rapid course, and without the palate showing the least trace the lesion is followed by a direct *bony* perforation of the hard palate.

In such cases, the probabilities are that a gumma of the palate has developed slowly, softening the bone around it, and finally the contents of the same have found their way to the mouth and nares, establishing an immediate communication between these two cavities.

In the region of the tonsils we find, according to the anatomical constitution of those organs, irregular ulcerations which penetrate more or less deeply, and which probably have for origin the breaking down of certain of those syphilitic tubercles which we have mentioned above, and which were localized in the tonsils. Gummatous tumors are also found in this region, but do not differ from similar complications in other buccal regions.

In certain cases we find a combination of both these gummatous formations and interstitial inflammations, in which the retractile tissue formed is liable to bring on deformities of the different regions. The lips will be deformed, and so much so that the saliva will run out of the mouth ; the tongue may be entirely changed in appearance, distorted, irregular, and when moving does so in a distorted manner.

This sclerous inflammation of the soft palate may prevent its adaptation against the posterior pharyngeal wall, and therefore produce the same functional troubles as would a true perforation of any part of the palate. So will retraction involving the anterior and posterior pillars of the pharynx.

Finally, if the syphilitic poison is especially virulent and finds a favorable developing medium in the organism, the deformity may become horrible ; the soft and hard palate, parts of the maxillary bones, of the tonsils, tongue, cheeks, lips, nose, may be eaten away, and yet the patient live for years.

Now we come to a more strictly technical part of our study, namely, the syphilitic manifestations on the dental organs and immediately adjoining parts.

The primary infectious sore never affects the teeth, but may be met with in the gums, as I have pointed out before.

The secondary manifestations are also very rare, and outside the mucous patches which almost always are more or less prevalent in the gums in a syphilitic case, I have occasionally observed nocturnal pains of the maxillary branches of the fifth nerve, indicating that cephalic regions are not exempt from the infectious process.

The tertiary period, however, is the one which offers the most determined lesions. The maxillary bones, and consequently the alveoli in which the teeth are implanted, present various changes, which, although not peculiar to syphilis, are often found in the later stages of that disease. The lesions are the following:

Both in hereditary and acquired syphilis the maxillary bones are often involved. Besides the gummatous tumors of the palatal process of the superior maxillary bone, which bring on perforation of the palate, we find gummatous lesions in several other portions of the bone. A gumma may develop in the infraorbital region and end in suppuration. The contents will find their exit by an opening on the skin in the corresponding region. Gummata may develop in any other part of these bones, and as a final result be the cause of more or less extensive necrosis. In the lower maxillary they may even bring on a fracture of that bone. In the upper and even in the lower maxillaries, as will be easily understood, if a gummatous tumor originates in the region of the teeth it will probably open in the mouth, resembling some large alveolar abscess of long formation, and will result in the final loosening and dropping out of the teeth. Opening in the antrum, it will be a source of irritation there, resulting in an empyema of that cavity.

In the alveolar region we find sometimes a species of infectious disease which cannot be differentiated from the other forms grouped under the name of alveolar infectious arthritis or Riggs's disease. More or less extensive suppurations exist around the teeth, pus oozing out at their necks, the teeth moving a great deal; yet the only difference I have observed is that in such cases, without local treatment except antiseptic mouth-washes, but under the internal treatment by iodide of potassium, the suppuration has been greatly reduced, the teeth have become more firm, and in some cases all traces of further trouble seem to have vanished.

In some cases the lesions may be so extensive as to involve the alveolar plate covering several teeth, which, becoming necrosed, is eliminated as a whole, instead of undergoing the melting process which we have just now mentioned.

Fournier and others have observed exostosis of the maxillary bones. I have noted extensive exostosis of the roots of the teeth in syphilitic persons, but I must acknowledge having met with much larger specimens of that lesion in persons who certainly never had that disease.

In cases of hereditary syphilis, Lanneloque, Parrot, and others have met with extensive cases of necrosis of the bone which resulted, when removed, in exposing the permanent teeth, which were partially developed and still contained in their crypts.

As to the syphilitic manifestations on the teeth themselves, they almost altogether belong to hereditary syphilis; yet Lawrence has been fortunate enough to observe a case of acquired syphilis in the first month after birth, in which he found, when the permanent teeth erupted, instead of the incisors, a very irregularly shaped tooth, which he extracted, and on examination of the same he found that the enamel extended very far up the roots; while the dentine on microscopical examination presented the most remarkable disposition of dentinal canaliculi, which instead of following the normal, almost linear course, appeared as if they had been wiped or stirred about, forming an innumerable number of loops.

The syphilitic dental manifestations, however, which we encounter are almost solely due to hereditary syphilis.

A very important point to consider is whether there are truly syphilitic dental lesions; that is, lesions which would justify us in asserting that the person in question has been infected by the syphilitic poison at a certain period of his embryonic life. To this I most emphatically reply, No.

Certain observers, such as Parrot, in France, and more recently Lawrence, believe that all dental erosions which originated at the period of formation of the dental organ were due to hereditary syphilis; that is, syphilis transmitted to the embryo, whose father or mother, or both, were affected with that disease.

Other observers, prominent among whom stands Magitot, believe that erosions of the formative period are never due to syphilis, but solely to infantile convulsions, which act on those organs by temporarily suspending nutrition. If the child suffers from an attack of that disease, one transverse line will be found; if several, three or four are found; then the child has gone through an equal number of convulsive attacks.

The celebrated anthropologist, Broca, who believed in the same origin of erosions as Magitot, and who found in a great number of prehistoric crania eroded teeth and unmistakable signs of trepanation, concluded that this latter operation was performed to cure infantile convulsions.

My limited observations compel me to accept neither of these two opinions as absolutely correct. I rather tend to the opinion of Fauchard, Tomes, Fournier, etc., who believe that any infectious disease of infancy may produce almost, if not the same, lesions that are found in truly syphilitic cases.

Still, among these eroded teeth there are certain forms suggestive of syphilis, and included in these are the forms of anterior teeth known as "Hutchinson's teeth." I must say that I have met with several cases of such teeth, and I have always been able to discover the syphilitic diathesis. Last summer I observed an interesting case of transmitted syphilis with Hutchinson's teeth. A woman, who had been contaminated by her husband immediately after marriage, had three children, aged respectively fifteen, twelve, and nine years; both the eldest and youngest children presented the typical Hutchinson's teeth, while the middle one, the twelve-years-old child, presented perfectly normal teeth, and was the only one who never had shown any traces of syphilis whatever, and was by far the healthiest-looking child.

The form of Hutchinson's teeth is known by every one. It is almost exclusively located in the "morsal" aspect (using Dr. Kirk's new and happily chosen term for cutting, tearing, or masticating surface, including all these terms, collectively or separately) of upper central incisors; sometimes, however, the laterals and cuspids may be involved. These teeth, if seen immediately after their eruption, present the following characteristics: They are much narrower at their morsal borders than at their necks; moreover, this morsal aspect is at first straight, but a crescent-shaped area of dental tissue, devoid of enamel and brownish in color, is seen along that border, and it is that portion which soon wears away and leaves the crescent-shaped concavity of the morsal edge, well known in those teeth.

These crescent-shaped or concave excavations may exist alone, or may be associated with other forms of erosions. First of all, and one of the commonest among hereditary erosions, is the pitted tooth, which has on its surface one or several small holes, which are always disposed along a line parallel to the cutting-edge of the organ ; there may be only one line of these pits, or four or five of them, corresponding to the time at which the organism was laboring under one or several new impulses, in the activity of the infectious poison or virus.

Another interesting lesion, and one which we are liable to meet in syphilis, is the "strangulated" constriction observed on certain teeth, as the central and lateral incisors of both upper and lower jaws, on the cuspids and especially on the first molars. These teeth look as if at an early period of their development a thread or cord had been tied around a portion of the crown, resulting in atrophy and a worm-eaten appearance of the constricted part of the crown, while the remaining portion is perfectly normal in appearance. As age advances, this atrophied portion becomes worn, and a flat, healthy-looking tooth remains.

There are also the grooved teeth. Several parallel lines may exist on the whole height of the tooth, forming in some cases regular stairs, for each new segment between two lines is smaller than the preceding until one reaches the morsal aspect, when the last segment is almost conical.

Sometimes erosions are not only limited to pin-point perforations, but form more or less extensive cavities with a flat bottom, and have a cup-like form,—cupule form, as named by Fournier.

Erosions are more or less symmetrical ; that is, if we find one lesion on a tooth on one side of the mouth, we are apt to meet with a similar one on the opposite side. For instance, if a left first molar has the lower half of the crown eroded and presenting the strangulated appearance, the probabilities are that the homologous tooth on the right side will present the same pathological signs, as regards form, location, and extent. Two or three pits on a cuspid will often indicate that the other cuspid is similarly affected.

These local lesions are not only confined to certain parts of a tooth, but in certain cases the whole crown of a tooth is filled with these pits, and not the least normal tissue can be found ; yet the general form is maintained.

In other instances, and especially is this the case with the lower central incisors, the teeth become stunted. They resemble nails or pegs which have been driven into the jaw ; and when taken out of the maxillaries, one could certainly not tell what part of the mouth they came from. Their appearance is much more like a supernumerary tooth than any other.

All these pits, grooves, cupules, and malformed teeth present a dark brown appearance, which brown appearance and material is, according to Lawrence, due to a micro-organism, which he hopes to demonstrate to be one of the specific microbes of this disease. In all eroded teeth of a syphilitic nature this author found, on microscopical examination of a vertical section of the tooth, in the enamel region a dark brown line, more or less regularly placed in the enamel, which shows the time at which the dental organ had to sustain the assault of the infectious process, and which, according to Lawrence's belief, can only be of a syphilitic nature. This brown line may not be continuous all around the enamel of the tooth, but wherever it is present one finds at the borders of the dentine a large number of interglobular spaces.

Besides these different lesions, the tissues of the teeth of syphilitic origin are very soft in structure, chalky, and are easily cut by instruments. Moreover, they wear out with great rapidity, and after a few years, if the disease came on early in the formative stages of the teeth, so as to involve only the parts in immediate relation with the morsal surface, all the defects of structure will be worn away and the patient yet have a fine set of teeth.

Not only in hereditary syphilis are the teeth affected in their structure and in their form, but also as regards the time of their eruption. Demarquay had a case in which a child born from parents both syphilitic only erupted her first teeth at the age of four and a half years. As a general rule, in syphilitic children the normal time of eruption is always more or less protracted.

Syphilitic erosions, as was at one time believed, are not only found on permanent teeth, but are also met with, although very rarely, on temporary teeth.

Lesions of temporary teeth are of course very rare, as they represent faulty nutrition at a very early period of embryonic life, and we know what too often is the result if disturbances, especially of a syphilitic origin, involve the embryo—namely, an abortion, and therefore the death of the embryo.

The lesions of the teeth, as I have already stated, are not sufficient to determine exactly whether syphilis has existed or not; but if other signs are present, they are a great decisive point. The other signs are usually the following: The infant has an aged appearance; his forehead is wrinkled; he looks as if he were a shrunken old man reduced to a baby's size; his skin is of a dark red color; his cry is peculiar, and indicates involvement of the larynx; he snuffles more or less persistently, indicating that some trouble exists in the nasal passages. Syphilides of the skin are found, as well as secondary manifestations of the mucous membrane of the mouth, mucous patches, which have a great tendency to localize themselves at the angles of the mouth, where, when they heal, they bring on certain cicatricial retractions which distort the lips. Disorders of the eye, such as iritis, choroiditis, and interstitial keratitis, have been observed. The latter affection, with the notched incisors appearing simultaneously, is pathognomonic of hereditary syphilis, according to Hutchinson.

An important and interesting question which has not been raised is, To what period of the disease do syphilitic erosions belong? I do not hesitate to ascribe them to the secondary period of the disease. According to the usual position occupied by these different lesions, very near the morsal aspect, it is at a very early period of the development of the tooth, during the first eighteen months after birth, that these lesions develop, and they are contemporary with secondary lesions of the skin and mucous membrane. Moreover, as syphilitic lesions seem to involve a set of tissues derived from one of the three blastodermic layers at one time, as for instance the skin, the mucous membrane of the mouth and other parts, which are usually involved during the secondary period, and which are derivates from the epiblast or external blastodermic layer, why should not the enamel-organ, which is also a derivate from the epiblastic layer, be involved at the same time during the same period of the disease? the tissues derived from the mesoblast, or middle blastodermic layer, being usually involved during the tertiary period.

The diagnosis of syphilitic lesions of the mouth may be summed up as follows: The hard, indurated chancre of the mouth could be taken for an ugly-looking soft chancre; but recollecting that this last lesion is very rare in the mouth, that no induration exists around it, and that it appears very soon after contact, will enable us to easily discriminate between the two lesions.

Epithelioma of the tongue and lips is also liable to be mistaken at first sight for syphilis; but the patient who is the victim of epithelioma has been suffering acutely for a long time, while chancre being painless, the continuance of the disease without any other skin-eruption existing, would point to epithelioma.

The mucous patches of the secondary period, especially if they ulcerate, very much resemble aphthæ; and whenever many of them are found scattered here and there in the mouth without having been preceded by general acute febrile symptoms, we must be careful in our diagnosis, and endeavor to trace their history, which the patient is frequently apt to hide.

Tertiary symptoms to which our attention will be most frequently called, are the ulcerated gummata. They may be mistaken at first sight for a primary chancre, but in gummatous tumors there is hardly any involvement of the sub-maxillary glands, which in chancre is very common and marked; and, besides, we have the history.

If we find an ulcer in contact with a broken tooth, the source of irritation must be first removed, and it will be well to wait a few days in order to see if there is an improvement; and if so, we may be sure that no syphilitic taint is behind the lesion.

It is more difficult to distinguish a lingual epithelioma from a gummatous tumor of the tongue, and the safer plan, in doubtful cases where no history is given by the patient, is to rely on the iodide of potassium, alone or combined with mercury, as the specific treatment. If the lesion is transformed by that remedy, it is syphilis; if not, we must look in another direction.

Speaking of the diagnosis between epithelioma and syphilis, it will not be out of place to mention here what takes place when both these diseases are present on the same individual. Prof. Verneuil, who specially studied this question, said that on several occasions he had observed an influence of syphilis upon cancer, but no action of cancer upon syphilis. If, for instance, an epithelioma of the lip develops slowly in the usual manner, and syphilis should suddenly be caught, the first lesion will take on a very acute form, invading rapidly the surrounding tissues and affecting all the lymphatic glands.

In addition, Dr. Verneuil claims that syphilis has a very favorable action, as regards the pain symptom in cancer, if syphilis be communicated after the first lesion of cancer has appeared.

In lingual epithelioma in particular—and this form of cancer, as almost all buccal cancers, belongs to the very painful malignant tumors—he has found that the cancerous growth became almost painless, even if the cancer had invaded the whole floor of the mouth.

In another case of lingual disease, two kinds of lesions were present. The anterior part was affected by tertiary sclerotic alterations, while the other half was the seat of an indurated and very characteristic papilloma with a double and voluminous enlargement of the lymphatic glands ; yet no pain was present.

Now we come to the treatment of the disease ; but as we are not often called upon to institute the general treatment, I shall rapidly pass over this final part of our subject.

As soon as the lesion has been sufficiently studied and observed, and we are sure that it is a syphilitic sore, we are justified in beginning the treatment, which consists especially in the internal administration of one of the salts of mercury.

Later on, on the decline of the secondary period, when the tertiary symptoms make their appearance, the internal administration of iodide of potassium comes into play, and it is really remarkable with what rapidity some of these gummatous tumors melt away when the potassium salt is given. In rare instances the iodide alone will not act, but in connection with small doses of mercury it is capable of working wonders.

Hence, whenever, after having removed all mechanical irritative points, we find that an ulcerative lesion of the buccal cavity does not disappear, we must administer from thirty to sixty grains of iodide of potassium in twenty-four hours, and continue its daily use for several weeks. After a week's treatment, sometimes, the whole lesion is changed, indicating its nature.

The mouth must always be kept in as aseptic a condition as possible by the use of antiseptic mouth-washes, such as thymol, boracic acid, chloral solutions ; while the lesions may be touched twice a day with the following preparation :

R—Salol, 4 grammes ;
  Liquid vaseline, 30 grammes. M.
Sig.—For external use.

As to the prophylactic measures to be taken, they are of the greatest importance.

If the father or mother of a family be affected by this disease, he or she must be absolutely forbidden to kiss their children, or to allow any one to use anything that could have come in contact with the infected mouth. We must remember, in this respect, the unfortunate case of Baxter, mentioned by Dr. W. D. Miller in his most interesting article on "The Human Mouth as a Focus of Infection," in which a child, three years old, caught syphilis by sucking his father's toothbrush. The mouth must be kept in a thoroughly aseptic condition by using any of the strong mouth-antiseptics, and even in some cases of extensive secondary lesions bichloride-of-mercury solution $\frac{1}{4000}$.

Common tumblers, such as are provided in American railroad cars for ice water, must be well washed before using.

Having mentioned the communion-cup in the first part of our paper, the question arises, How can we remedy the danger to which we are exposed in connection with it?

Either by *obliging* each person to wipe the border of the cup, or by drinking in a particular way.

As we know that the internal surface of the lower lip is often eroded, and hence is the source of danger, the mucous membrane must not at all be brought in contact with the under and outer surface of the cup, nor even with its border. We must accustom ourselves, when obliged to drink collectively, to do so by applying the outside surface of the lip or skin portion against the border of the cup ; that is, the inside of the cup, tumbler, or glass must be brought in contact with the skin of the lip, and *not* the mucous membrane, at about one-third or one-half inch below the junction of the mucous membrane with the skin. When the glass is firmly held, and slowly raised, the liquid will easily pass into the mouth, and this only requires a few days of practice. As the outside skin, unless wounded, is almost impermeable, there is much less danger of becoming contaminated than by the ordinary way of drinking.

All dental instruments having come in contact with syphilitic patients must be placed in boiling water for at least half an hour, before they are again used.

We must also be careful to protect our finger with a napkin, moistened with a strong bichloride-of-mercury solution, if we place it so as to guard the mouth against the slipping of an instrument.

Again, after an operation on a syphilitic patient the hands must be washed for two minutes in a $\frac{1}{1000}$ bichloride solution.

PUS-FORMATION, REVIVED.

BY DR. D. R. STUBBLEFIELD, NASHVILLE, TENN.

(Read at the twenty-third anniversary meeting of the First District Dental Society of the State of New York, January 20, 1892.)

SUFFICIENT apology for the renewal of an old subject is found in the indisputable fact that the rank and file of the profession fail to a large extent to digest, so to speak, the new matter presented through the journals from the few original investigators that the world possesses. If I shall succeed in rendering the nature and formation of pus more clear to some, I shall deem the attainment of that much a full compensation for the time and patient work incident to the undertaking.

The following substantially direct quotations from a personal communication will open the subject in the middle of things, and fully show why the task was assumed, and why the present method of sequence was observed.

It was written, "It is believed that all bacteriologists claim that pus, wherever found, contains bacteria, and that the bacteria are intimately concerned in causing that pus. They substantiate this position by injecting into a rabbit's leg a virulent, poisonous acid, and thereby develop a suppurating wound. Then, by exclusive argumentation, the same acid, hermetically sealed in a thin glass shell, is put into an incision and healed in. After perfect union the shell is crushed, liberating the acid, and no suppuration is developed. This is due to the exclusion of bacteria. This seems to advocate the theory that bacteria do not float in the blood, and so reach an internal wound.

"Here comes a condition not uncommon in dental practice. A patient falls, strikes a tooth, which, becoming sore, brings about a visit to a dentist. Tooth sound, but from the history and a slight opacity it is surmised that the pulp is dead. A drill-hole is made into the chamber, when pus freely exudes. Upon attempting to remove the pulp, however, it is discovered that it is far from dead, and an application of arsenious oxide is necessary before its removal can be effected. Now, here we have unmistakably pus running from a locality which has been well protected from the external approach of bacteria. If we are to suppose that they have entered through the circulation, why is it that the point most distant from their entranceway—the foramen—is suppurating, and not that part which is around and about the foramen itself?

"Is it possible that bacteria do not cause suppuration?"

We have in the foregoing extract the gist of what was asked. The author voices the doubtful opinions existing in the minds of so many of our profession, that we feel fully justified in this attempt to remove the foregoing uncertainty. We express the hope that this effort shall be so thoroughly supplemented, not to say corrected and added to, by the discussion, that all may be clear and positive in their understanding of the subject.

We propose, as possibly the most natural and effective method, to reply straightway to each question as it occurs, and then to follow immediately with the reasons which have been derived from the best possible sources.

First, "Bacteriologists claim that pus, wherever found, contains bacteria." It may be just as well, at the very outset, to correct the impression prevailing so generally that *bacteria* and the causes of pus, *micrococci*,—as we shall see,—are the same, and their names, therefore, are interchangeable terms. This is a mistake, although its full effect may be rarely, if ever, felt, because it is so usual, and accepted even among those who ought to strive for exact perspicacity. To be very brief at this time, we may state that *bacteria* or *bacilli* are elongated, rod-like micro-organisms, which are the active agents in putrefaction. They exist wherever foul odors are present. On the contrary, *micrococci*, of three varieties, are the causes of pus, and never cause what is commonly called putrescence. Therefore the term permitted above should very properly be changed to *putrefactive-alogists*, unless we shall permit a very loose and indefinite nomenclature to exist. It would be exceedingly difficult to frame a pronounceable, not to say a mellifluous, term to denominate one who occupies himself in the world of micro-organisms. We would suggest, however, *micro-organalogist*, as etymologically meeting the demands of the case.

The claim that pus, wherever found, contains the cause of pus is not true. The three forms of micrococci that cause pus demand for food dead—that is, devitalized—but undecomposed organic substances, but they cannot thrive on the products of decomposition. As soon as the supply of dead, undecomposed animal tissue is exhausted, the micrococci starve and perish. Biologists teach that reproductiveness exists in increasing ratio as we go down the scale of organized being. We may not be surprised, therefore, to find that though the micrococci are gone, their *spores* or seed exist in great number, which, while dormant in the pus, would awaken through the stimulation of fresh pabulum under favorable conditions.

This brings us to the clause completing the first sentence in the quotation, which reads,—

"And that the bacteria are intimately concerned in causing that pus." This is true, although it is not a rule without exception. Professor Gerster, in his admirable exposition of the antiseptic and aseptic method in surgery, cites a case illustrating the fact that the introduction of micrococci into the organism does not always produce suppuration. Every manifestation but the crucial one was observed, indicating systemic intoxication from septic infection ; but the patient, he says, went off glorifying in his triumph of endurance over diagnostic acumen. The rarity, however, of such an escape is so conspicuous that we may be permitted to point the moral from its departure from the rule. Modern surgery declares that inflammation is a physiological process if carried on without septic infection.

The older teaching that all wounds must heal by suppuration, if not by first intention, has been clearly refuted by the well-supported claims of antiseptic surgery. Pus does not always contain micrococci, for they may have starved before the examination ; and micrococci, in rare instances, may fail to produce pus, owing to an excessive vitality of the other organisms ; but when pus is present we may assume as incontestable that it was caused by the presence of micrococci.

Secondly, our quotation says, "They substantiate this position by injecting into a rabbit's leg a virulent, poisonous acid, and thereby develop a suppurating wound. Then, by exclusive argumentation, the same acid, hermetically sealed in a thin glass shell, is put into an incision and healed in. After perfect union the shell is crushed, liberating the acid, and no suppuration is developed. This is due to the exclusion of bacteria." This is only partly true. The injection of a corrosive agent, properly guarded antiseptically, does not result in suppuration, though necessarily followed by destruction of tissue. We think the author used the wrong terms when he spoke of a "virulent, poisonous acid," for we have not found any mention of any experimentation with such an agent. If we interpret him to refer to corrosive agents, like croton oil, corrosive sublimate, etc., we may obtain a most lucid and convincing refutation to the theory that destruction of tissue by chemical agents always produces pus, from Professor Gerster. He says, "The common experience that certain acutely irritating substances, as, for instance, croton oil, oil of cantharides, turpentine, concentrated solutions of corrosive sublimate, and others, brought in contact with living tissues, always should produce suppuration, represented a serious gap in the theory of microbial origin of suppuration. If invariably proved, it would be more than a defect, as it would positively contradict the theory that suppuration is exclusively and *always* the result of the development of micro-organisms. The experiments of Councilman, who introduced under the skin of animals small glass globes filled with sundry irritating substances, and then crushed them, all led to suppuration. Scheuerlen and Klemperer, however, in going over Councilman's experiments, showed that his procedure was faulty, inasmuch as precautions had not been taken to exclude the introduction of microbes along with the croton oil, etc. They, moreover, positively demonstrated by a large number of successful experiments that wherever thorough aseptic cautions were observed, suppuration never followed the introduction of even very considerable quantities of the mentioned substances. Small quantities caused some exudation of plasm, and then were absorbed outright. Afterward the fragments of the glass receptacle were found imbedded in a film of connective tissue. Larger quantities of croton oil, for instance, caused a coagulation-necrosis of a limited mass of tissue, which was found dense, bloodless, and of a yellow color. These nodes of necrosed tissue were gradually absorbed, *suppuration never following the experiment.* This fact is in full accord with other incontestable facts of the same character, as, for instance, the absorption of necrosed ovarian stumps in the abdominal cavity, if there be no microbial infection present.''

This places the foremost belief on the subject clearly and tersely before you. The complete disproval of the almost classic results presented by Councilman, and accepted so long as conclusive by the world, ushers in a new era of belief. The opinion, we believe, in the profession has been in accordance with the revelations of Councilman, and we rejoice to be able to present the later and better view. In that learned and carefully prepared monograph on the ''Origin of Pus,'' by Dr. W. H. Atkinson, who, along with the benefits he conferred upon our profession, was ever conspicuous in presenting the cream of new literature and experiments, we find Councilman's results acknowledged and unquestioned for correctness.

Thirdly, in our quotation we read, ''This seems to advocate the theory that bacteria do not float in the blood, and so reach an internal wound.'' If we are to understand by *bacteria* the active, proliferating causes of pus,—the micrococci,—we think we may boldly advocate the theory that they do not float in the blood, except when the organism is already the seat of septic infection, diffusing itself far and wide. Antiseptic surgeons all agree that septic infection must come from without; although once in, it may be the cause of *metastatic abscesses.*

We know, also, that the spores, or seed, of the micro-organisms may float in the atmosphere and may be inhaled into the lungs. But we must speculate purely when we assert that they freely enter the blood-current. If they should, however, we know they are not able to develop morbid conditions, but are able only to develop in a favorable *nidus* produced by some other cause. Professor Thomas Fillebrown presented at length ''Vitality as a Germicide,'' and we must all agree with him that the inhibition of vitality upon the adventitious spores that may find their way into the complex avenues of our physiological city renders them harmless adventurers. If, however, a lesion occurs, a change from normal vital resistance is found at any point, the spores begin at once to take on changes from the stimulation of their most welcome pabulum, and infection is established. This conclusion is easily and logically reached if the presence of the spores in the blood is granted. With reference to this point some speculation may arise. If there has been, or is at present, an abscess within the organism, it is not asking too much to grant that the spores may be passed into the circulation by the retrograde metamorphoses going on all the time.

As to whether the spores afloat in the atmosphere and inspired by us can pass the endosmotic wall of the lung-cells, varied opinions may exist. Our own opinion is that they can go through, and do constantly, with the same impunity that the myriad microscopic life found in the water we drink passes through the wall of the stomach. Still, if it were denied, the presence of abscesses at some time present or remote is so constant that they might be relied upon for spores inside the organism. The measure and extent of the abscesses being always in the ratio of the tissue lowered in vitality, so as to be brought within reach of the spores.

Fourthly, our quotation says, "Here comes a condition not uncommon in dental practice. A patient falls, strikes a tooth, which, becoming sore, brings about a visit to a dentist. Tooth sound, but from the history and a slight opacity it is surmised that the pulp is dead. A drill-hole is made into the chamber, when pus freely exudes. Upon attempting to remove the pulp, however, it is discovered that it is far from dead, and an application of arsenious oxide is necessary before its removal can be effected. Now, here we have unmistakably pus coming from a locality which has been well protected from the external approach of bacteria. If we are to suppose that they have entered through the circulation, why is it that the point most distant from their entrance-way—the foramen—is suppurating, and not that part which is around and about the foramen itself? Is it possible that bacteria do not cause suppuration?"

In the light of what has already been cited from the best sources, this enigma may be easily deciphered. The pulp being a body of a peculiar gelatinous consistency, suffers, like the brain, from the shock or jar of a sudden concussion. In the case recited above, the tooth had been subjected to a shock that, while not enough to cause a change of molecular nature throughout, was sufficient to cause a molecular change in the extreme portion of its mass. This change rendered it, to that extent, unable to resist the attack made by the morbific agent—the spores of the micrococci—passing, it may be, through the round of the blood.

It may be illustrated by the presence of marauders or freebooters in a seaboard town passing through the streets without harm to any one because of the protection of police or some other municipal force, but the relaxation or absence of such protection is the signal for depredations to commence.

Thus the spores of the micrococci present in the blood-current as harmless drift, so to speak, become transformed by favorable opportunity into agents of destruction. The limitation is put upon their action, as it is in the case of all circumscribed inflammatory processes, by the inhibiting power of vitality, which opposes a successful barrier to the diffusion of ptomaines. The line of demarkation is drawn between the sick and the well, and it is maintained with certainty against the disease-producing agent.

Pus is formed by the usual transformations within the limited area; health reigns beyond it.

From the consensus of opinion among the latest and best surgical authorities, it is not possible that bacteria—that is, micrococci—are not the cause of suppuration.

This ends our reply to the interrogatories propounded by one of the most alert minds of the profession ; but we shall not deem our task completed until we have more fully met the precise demands of our subject title. To that end, therefore, what is suppuration, and what is pus? To answer these questions intelligibly, we must first speak of inflammation, its nature and phenomena. Literally defined, inflammation is merely a preternatural heat ; but the world of surgery has long gone beyond, and we may add below, the mere surface indications that first directed attention to local and systemic phenomena now well understood. The disturbances of nutrition, producing hyperæmia, heat, redness, swelling, and pain, and the extended illustrations necessary to show that several or all of those phenomena must be present to give character and certainty to any inflammation, would consume too much time and space for us here. Our subject being not a research into, but rather a lucid explanation of, the essence of inflammation as understood and explained by the best modern authors, a brief sketch of the leading features of the process will be sufficient for our needs. Whether the cause of inflammation be one of direct injury and irritation of a part, or whether it be due to lesions of the inhibiting nerves or trophic centers remote from the local expression of the morbid process, the pathological changes are practically the same. The activity and violence of these changes will depend in part upon the character and extent of the injury, the presence of certain forms of micro-organisms or animal poisons, as well as upon the anatomical character of the part involved, together with the ability of the tissues to resist death and to repair the damages inflicted. It is known that when a vascular living animal tissue is subjected to irritation the vessels within the zone of irritation undergo an instantaneous contraction, followed almost immediately by abnormal dilatation. This contraction is the response of the vaso-motor nerves ; the dilatation, more complex, is due to paralysis of the inhibitory nerves, to early changes in the vessel-walls, or to over-stretching of the connective and elastic tissue which supports the vessels. Hyperæmia naturally ensues, and is followed by a more or less complete blood-stasis, which is most marked at the center. At this stage, leucocytes in unusual proportion appear in the capillaries and venules, to the walls of which they adhere and through which they pass into the intervascular spaces. Following them we find a more or less extensive effusion of red blood-disks and liquor sanguinis. This localized structural excitement brings about active cell-proliferation, and this results in the rapid formation of the common embryonic tissue. This embryonic tissue is known to be composed of protoplasmic bodies or cells, spherical, slightly polygonal from pressure, and varying in size from $\frac{1}{3500}$ to $\frac{1}{2000}$ inch, and sometimes even larger. They may be nucleated, but usually appear as slightly cloudy or granular protoplasmic bodies without distinct nucleus or nucleolus.

A diversity of opinion exists as to which of the normal cells are most active in the formation of new tissue ; but the safest view seems to be the one that holds that all the cells undergo proliferation when stimulated, and all combine to develop the embryonic tissue as a common product. This conclusion seems rational, since the normal *rôle* of every cell element of the body is one of proliferation and the formation of new elements to replace those that have finished their life-history, and it seems reasonable that a more rapid proliferation of the same cells would recur under conditions of increased hyperæmia, and therefore exalted nutrition.

The products of the inflammatory process may be organized into permanent tissue, or failing in this may perish. The peculiar type of the new tissue is probably determined: (1) By the nature of the original cell from which it sprung. Thus the experiments of Goujon showed that the medullo cells and myeloplaxes of bones in young animals, when injected into the muscular tissue, developed into bone even remote from the parent tissue. (2) By the location and function of the new tissue, as is shown in the development of exostoses from a common embryonic tissue near the insertion of tendon into bone.

When the inflammatory process is rapid and severe the new tissue may perish suddenly, and with it occurs the rapid death or gangrene of the tissue involved. Under milder conditions, however, the supply of nutrition being more gradually diminished, the embryonic cells undergo fatty degeneration and absorption, which is called resolution.

This gives us a *résumé* of the phenomena of inflammation, and presents the subject very briefly. We see from it why inflammation has been very properly called a physiological process when unmodified by septic infection. It has fallen to the lot of the school of antiseptic and consequent aseptic surgery to recognize and explain this process, modified by the introduction of micro-organisms and their morbific products, called ptomaines. All authorities agree that septic infection must come from without the organism. The varying intensity of different cases of infection seems to depend in a great measure upon the varying degrees of vitality of different microbial cultures. Recent putrescence is so abundant in all human surroundings that it is an easy matter, almost unavoidable without antiseptic precautions, to introduce into the system considerable masses of active, proliferating micro-organisms. The dry spores floating with the air will be easily taken care of by the living, unbroken tissues; for inherent in them we find that mysterious power of nature tending always toward the maintenance of health. Every injury, however, causing a wound, destroys the vitality of those cells that lie in the direct path of the agent producing the lesion. These injured cells, combined with the blood and lymph that is poured out, constitute an area of dead but not decomposed albuminoid substances. This type of organic matter furnishes the richest and most welcome pabulum for the rapid development of myriads of micro-organisms. From the moment of their introduction we find the process of inflammation modified. The succeeding steps are marked now by a strength and sympathetic effect upon the entire organism before unfelt. The existence of micro-organisms—a kind of fermentation—is marked by the rapid development of an exceedingly diffusible and poisonous product called ptomaines. By its great diffusibility this agent reaches the adjacent vaso-motor nerves, that soon show a toxic impression, and the equilibrium between them and the inhibitory nerves is destroyed. Soon after this the blood is altered, and the vascular walls lose their ability to hold their contents. The surrounding tissues are infiltrated with corpuscles—white and red—and also plasma, as a consequence of this intoxication. Stagnation and infiltration produce a high degree of tension, leading to compression of the larger afferent vessels. The infiltrated portions devitalized by suppression of normal circulation readily succumb to the inroads of the millions of micro-organisms, and actual necrosis rapidly ensues. The last stage of textural destruction is the final liquefication of the tissues and infiltrating leucocytes, aided by the exudation of large quantities of lymph-serum from the adjacent obstructed blood-vessels. This is the formation of an abscess, or a cavity filled with lymph-serum, myriads of dead, white blood-corpuscles, and quantities of shreds of necrosed tissues; in a word, pus. When septic invasion has been of sufficient extent and well advanced, the great tension of the parts will necessarily cause an overflow of the diffusible contents of the focus into the radiating efferent vessels, the veins and lymphatics. The ptomaïnes, thus entering the general circulation, will at once produce systemic intoxication, manifested by marked rise of bodily heat, rigors, sickness, headache, delirium, and general dejection; in brief, that pervading irregularity of the entire nervous system known as septic fever.

The causes that produce the phenomena above recited are certain micro-organisms that may lead a parasitic life in the human organism. Without attempting to consider all that might be dwelt upon, it is sufficient for us now to consider only those that are known to be the active causes of pus-formation. The most common source of suppuration, according to Rosenbach, are several varieties of globular fungi called micrococci. These are so few that we may readily retain their names and general characteristics. They are the *Staphylococcus pyogenes aureus*, the *Staphylococcus pyogenes albus*, and the *Streptococcus pyogenes*. The *Staphylococcus pyogenes aureus*, or golden grape-coccus, cannot be distinguished from the second variety, the *Staphylococcus pyogenes albus*, or white grape-coccus, under the microscope, and must be seen with reflected light to develop the color which distinguishes it. The morbific action is quite indistinguishable, as both possess the ability to thrive upon animal tissues, causing coagulation, emulsification, and distinct abscess. They occur in colonies or groups, like grapes in the bunch, and hence get the name grape coccus. The third variety, *Streptococcus pyogenes*, or chain coccus, seems to be slightly less active than the other two varieties, except as to its facility in entering vessels and causing progressive gangrene.

These varieties of cocci constitute the living germs that act as the causes of suppuration. Suppuration, as here referred to, must not be confounded with what is commonly called putrescence. Decomposition of tissues, accompanied by the evolution of foul odors, is always due to the fermentative action of diverse forms of elongated, rod-like bodies called bacilli or bacteria. These are seen in association with the cocci pyogenes, where the pus-production is complicated by the decomposition, properly speaking, of tissues, evidenced by foul odors. The failure to keep these two terms clearly apart renders many otherwise excellent essays obscure to a certain extent, and we trust we may be permitted, thus incidentally, to make a protest on behalf of the profession at large. As long as morphological microscopists are able to differentiate micro-organisms by forms, why not give us the benefit of such separation, uncomplicated by the exchanging of terms until confusion is worse confounded? Let us stick to *coccus*, a globular micro-organism, several varieties, and pus-producing; and then, *bacterium* or *bacillum*, a micro-organism of elongated, rod-like form, foul-odor producing. If we have form clearly separated, we may hope to more readily associate function —disease-producing power—with the different shapes.

All forms of suppuration owe their origin, as we have previously stated, to infection from without the organism. The epithelial layer of the skin or mucous membrane must be broken to admit the micro-organisms. Not all injuries, trivial or otherwise, however, are infected from the beginning. Their frequent spontaneous healing proves them aseptic. Even gunshot wounds have been known to heal without suppuration. An exceedingly interesting case of pistol-shot wound of the tongue and parts posteriorly contiguous is cited by Professor Gerster in proof of this statement.

But when the entrance into the system has been gained, whether superficial or deep, the phenomena recited above as typical of the inflammatory process, modified by microbial infection, appear in more or less pronounced ratio. The intensity and extent of these phenomena depend, first, upon the virulence of the micro-organism introduced; secondly, on the quantity absorbed; and thirdly, on the power of resistance of the organism invaded,—that is, the status of the *vis medicatrix naturæ*.

Suppuration from mechanical irritation by foreign substances seems to be a myth, unless attended by the introduction of micro-organisms. There may be pain caused by pressure on the nerves or interference with motion, but, as a rule, this will not cause suppuration unless carrying within the organism the causes of pus.

Dead organic substances, the most acceptable pabulum to micro-organisms, as blood, cubes of animal structure, as muscle, tendon, liver, or bone, have been introduced with antiseptic precautions from freshly killed animals into the abdominal cavities of others, and in a large proportion of cases no systemic perturbation whatever followed. When they were killed it was found that the blood was absorbed outright; that muscle, liver, tendon, and bone were encysted; and that disintegration and absorption, preceded by the invasion of granular tissue, were indicated as advancing in the proportion of the density of the implanted materials. In all cases, however, where antiseptic precautions were neglected, septic purulent peritonitis was the rule. These experiments are fully corroborated by the observations of ovariotomists, who have seen massive pedicles, dead through stoppage of their circulation by ligation, dropped back harmlessly into the peritoneal cavity to be ultimately absorbed.

With reference to chemical irritation we have already written, and have seen that corroding substances, introduced under stringent antisepsis, produce even necrotic masses, but not suppuration. Two experimenters, Scheuerlen and Klemperer, have conclusively refuted Councilman and others, who declared that glass spherules containing corrosive chemical agents, when crushed under the skin, invariably produce suppuration. Dr. W. H. Atkinson states that Grawitz and de Bary found that a solution of common salt, containing *Staphylococci* themselves, when introduced subcutaneously, produced œdema, but not suppuration. If such was the case, the antiseptic power of the sodium chloride was sufficient to throttle the proliferation of the micrococci. Too many observers unite in this conclusion—that micrococci always produce pus when it is produced—for us to doubt its correctness.

In connection with chemical, we find that caloric irritation, or even destruction of tissue by heat, presents a similar immunity from suppuration when perfectly guarded from microbial infection. The modern use of the thermo-cautery in the peritoneal cavity and elsewhere is followed by uninterrupted union when adequate aseptic precautions are employed. The mass of dead tissue, whether produced by ligature, chemical corrosion, or red heat, will never assume the irritating nature of a so-called "foreign body" if micro-organisms are perfectly excluded.

On the contrary, when micro-organisms obtain entrance by a lesion into the organism, inflammation and suppuration follow as an almost invariable rule. The war between disease-germs and health-tendencies results more or less rapidly in the formation of a zone of embryonic connective tissue that forms a dense wall around the area of destruction. This proves a barrier more or less effective against the extension of the septic invasion through the absorption of the soluble deleterious substances into the general system. The contents of the abscess is pus. Its formation has been accomplished by textural destruction and death, and systemic intoxication. Gerster says, "Healing by suppuration is an absurdity, misleading to the student, and should be banished from the text-books. As a matter of fact, healing never takes place while active suppuration lasts; it occurs only after the limitation and termination of suppuration,—*not by it, but in spite of it.*"

Equally under his disapproval is the expression "laudable pus." Pus is never laudable. It is always a menace to the health and integrity of the animal organism. Its formation is a treacherous ally, which should be the last resort.

The chemical constitution of pus is open to all.

METHODS OF FILLING TEETH.*

BY RODRIGUES OTTOLENGUI, M.D.S., NEW YORK, N. Y.

(Continued from page 652.)

SPECIAL PRINCIPLES INVOLVED IN THE PREPARATION OF CAVITIES AND THE INSERTION OF FILLINGS.

I HAVE divided cavities into three general classes: approximal, crown, and surface, the last including all parts not covered by the other two. Strictly speaking, however, all three of these terms were intended to apply to that portion of the tooth which is normally covered by enamel. A cavity existing in the root of a tooth, and not owing its inception to caries beginning at some other point, is a rarity, which, with a single exception, needs no particular mention in this work. This exception will be alluded to later.

There is, however, a cavity which in its earliest stages frequently

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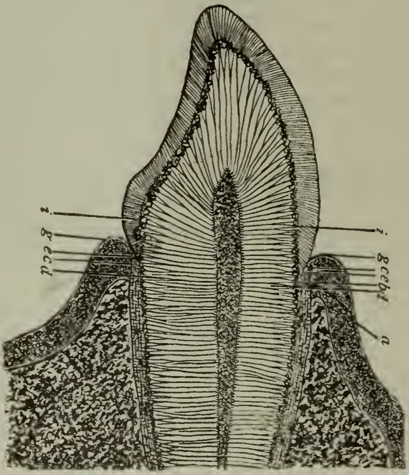
demands our attention; and this I may as well consider now, before taking up surface cavities proper.

Recession of the gum often results in a line of distinct sensitiveness along the neck of the tooth just above the bulge of enamel at the labial aspect of the anterior teeth.

The patient will report the occurrence of pain on brushing the teeth, and that even touching the part with the finger-nail produces an unpleasant sensation. In the earliest stages an examination may reveal nothing except a corroboration of the facts stated, the tooth itself showing no signs either of deep decay or of superficial softening. A filling seems contraindicated in the absence of a cavity, yet the patient may insist upon having relief.

In order that the condition may be thoroughly appreciated, as well as the remedy which I shall advise, it will be necessary to enter somewhat into the etiology of the condition. I have never seen *enamel* sensitive upon its outer surface. If others have noted such a phenomenon, it is sufficiently anomalous to be unconsidered in this connection. I have never seen *cementum* sensitive. Sensitive *dentine*, however, is common. Thus, dentine being the only hard tissue of the tooth which is responsive painfully, it would seem to follow logically that pain at the neck of a tooth must be due to an exposure of the dentine. Fig. 173 represents a sectional view through a cuspid. It is diagrammatical, but is nevertheless sufficiently accurate, since in making the original of the illustration I have produced the various parts by copying drawings which I made from microscopic specimens in the laboratory of Dr. Carl Heitzmann.

FIG. 173.



The first point of interest to be noted is that normally, at the neck of the tooth, the cementum, *c*, overlaps the enamel, *e*, just beneath the free margin of the gum, *g*. As this gum recedes, possibly as far as the line *a*, the cementum becomes exposed and gradually disappears, thus leaving the dentine exposed at *b*. Very soon thereafter the part may become excessively sensitive. This leads to a consideration of the dentine, *d*, especially at this point. Sensitiveness in dentine has long been attributed to the dentinal fiber. This fiber, though traced as far as the odontoblastic layer of the pulp, has not been positively seen to anastomose with a nerve-fiber of the pulp itself. That it has the power of transmitting sensation is generally admitted. It has also been universally observed that dentine immediately below the enamel is more sensitive than elsewhere. Exactly at this point we have what is termed the interzonal layer, as at *i*. The fibers of the dentine bifurcate as they approach this territory and enter it, after which they can be traced as distinct fibers only very sparsely. This might tend to the impression that this interzonal layer should be less sensitive than the main mass of the dentine, but there is considerably more living matter here than in the denser portion, where the tubuli are distinct. Dr. John I. Hart, in an able paper on this subject,* claims that exactly at the neck of the tooth the character of the interzonal layer changes, and that immediately underlying the cementum he finds a granular layer. This I have not myself seen ; but the doctor admits that this is very richly endowed with living matter, and so accounts for the sensitiveness.

The mere exposure of this dentine, however, would probably not cause any annoyance to the patient. This leads back to the statement that after the recession of the gum the cementum begins to disappear. I think this is probably due very largely to the tooth-brush, the cementum wasting away by friction. This view is sustained by the fact that though the recession of the gum may occur on the palatal as well as the labial side, the sensitiveness will occur at the labial only. At least I have never observed such a disturbance at the neck on the palatal side of any of the anterior teeth, except when contact with a part of an artificial denture had caused an abrasion or superficial caries.

The destruction of the cementum, then, may be chiefly attributed to the action of the brush, and, therefore, as soon as the dentine is reached it will suffer from the same cause, so that presently the living matter of the interzonal or granular layer becomes exposed. At first it may be responsive only to contact, as when touched by the bristles of the tooth-brush or by the finger-nail. Later it will give pain when subjected to excessive heat or cold, or to the action of acids or sweets.

If taken in this early period, the remedy is as simple as it is effectual. With a clean, smooth burnisher, rapidly revolved in the engine, burnish the affected part, using considerable pressure, and continuing until the patient ceases to shrink. If this be thoroughly done, the operator and patient will be astonished to observe that the part can be freely touched painlessly. How has it been accomplished? Possibly it is that the burnisher drags together the gaping sides of the minute openings in the dentine, thus closing them and covering up the living matter, which the excessive heat from the friction may also serve to devitalize. Thus a crust is formed over the responsive tissue, so that it is shielded. Fortunately, if the use of a very soft brush be adopted, the sensitiveness will rarely recur within six months or a year, when the remedy may be applied again. Where carious action has actually begun, a superficial softening having supervened, the procedure is slightly different. It is at this time that the tooth will ache after the use of acids or sweets, etc., and an irritation of the living matter has probably occurred. Touch the part with a saturated solution of nitrate of silver, and allow this to remain for a few days. This will discolor the tooth, and, whilst effectual in allaying pain, is a disfigurement. It must therefore be removed with a corundum, or with a polishing-point and pumice. This will at the same time take away the softened dentine from the surface, and the sensitiveness will again be noticed, though in a lesser degree. The burnisher must consequently be resorted to, and persisted in till no softness appears on the surface. This may leave a deep groove, but, especially with women, will be preferable to an unsightly gold filling. Of course, where greater progress has been made, so that a distinct cavity is produced by the removal of softened dentine or decay, a filling is unavoidable.

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* See DENTAL COSMOS, p. 723, vol. xxxiii.

This sensitiveness at the neck may also occur on the molars ; and here we do sometimes find it along the palatal as well as the buccal side. It may also result where attrition has worn down the masticating surfaces till the interzonal layer of dentine becomes exposed. This is a good place for the free use of the nitrate-of-silver treatment. The dam is to be applied, if possible, and the parts touched with the saturated solution, which is allowed to dry. I have treated teeth in this way, sometimes renewing it two or three times at successive sittings, until by the blackening of the surface I was assured that a heavy deposit coated the parts. These teeth not only ceased to be sensitive, but I have noticed that even where carious action had begun, the surface being softened, the caries has been aborted. I have also seen teeth which I had treated in this way five years previously come into my hands again, when, mistaking the discoloration for nicotine stains, I have proceeded to cleanse them. In every such case the patients have returned within a week, complaining that the sensitiveness had returned.

The condition which I have been describing should never be mistaken for erosion,—an error which might be made with the anterior teeth. Yet the distinctions are well marked. With erosions we almost always have the enamel involved. I might say always, for the exceptions are only where the erosion, starting upon the enamel, may spread so as to involve the neck. Again, the erosion will always present with a sharply defined outline, and sensitiveness rarely if ever occurs. This fact is another evidence that the cupping-out of crowns, which are often extremely sensitive, are not erosions. The disturbance at the neck, on the contrary, is sensitive, has no distinct borders, and the enamel is never encroached upon until caries is present.

Surface Cavities.—Cavities upon the surfaces of teeth, other than the approximal, may result from erosion, green-stain, or caries. The last may have as contributory causes, abrasion, malformation, or recession of the gums.

Erosion.—The etiology of erosion is still shrouded in doubt. It is probably a distant symptom of a constitutional disturbance, which has affected the secretions of the mucous glands so that they discharge mucus in which there is an acid present, which has an erosive influence upon enamel and dentine. It is rarely, if ever, seen upon the masticating or approximal surfaces of teeth. It is most common upon the labial surfaces of incisors, cuspids, and bicuspids of the superior set, and cuspids and bicuspids in the inferior. It may occur, however, upon any tooth. Its most distinctive characteristic is that the affected part is hard and highly polished. Erosion may also be said to assume typical forms, of three general varieties. The most remarkable of these is where the disease eats out an acute angle, one line of which is at right angles to the surface of the tooth. This is made plainer by Fig. 174, which gives a profile view of a superior bicuspid, the erosion showing at *a*, whilst in Fig. 175, *a*, we see the same class of erosion in a lower bicuspid. A point which must have some clinical significance, but which I am at a loss to explain, is this : that though the one tooth here is from the upper jaw, and the other from the lower, the erosions are identical. In each case *the line of the eroded angle which is at right angles to the labial surface of the tooth*, *is at the top*, *the oblique line extending downward.* In this form of the disease, the pulp-chamber is frequently reached, secondary dentine, however, being deposited, so that the pulp does not become exposed. In a few cases the crown has been cut through so far that it has been lost by fracture. The progress is usually slow.

FIG. 174.

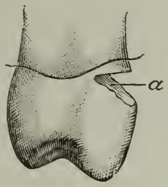
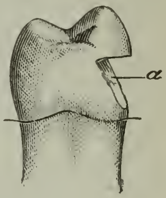


FIG. 175.



A second, and to my mind the most dangerous form of the disturbance is an irregular concavity. A patient with a beautiful set of teeth may come in within three months of his last visit, and show small eroded spots on the labial surfaces of several teeth. Within a year they may grow to thrice the size, and in from five to ten years the dentine may be denuded from gum to incisive edge. Unless the constitutional disturbance which is behind this can be controlled, gold fillings serve only a temporary purpose, if they are beneficial at all. Fig. 176 shows a central incisor with a point of erosion on the labial surface. This was filled with gold, and five years later presented as seen in Fig. 177, the filling still in place at *a*, but entirely surrounded by erosion, which continued.

FIG. 176.

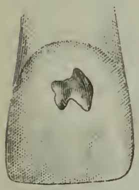


FIG. 177.

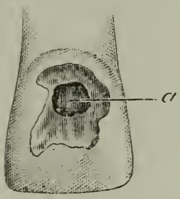


FIG. 178.

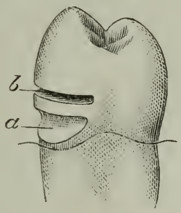
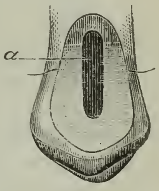


FIG. 179.



The third form is a uniform groove, which may be deep or shallow in proportion to its width, and may be quite short, or long enough to extend from one approximal surface to the other. They are most commonly seen near the gum. Fig. 178 shows a bicuspid in which is seen the shallow groove near the gum, at *a*, whilst above it, at *b*, is an extreme example of the deep groove, appearing as though cut with a file. It is not difficult to imagine this converted later into the form shown in Fig. 175, by the fusion of the two.

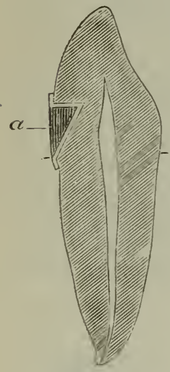
Fig. 179 shows a singular case which came under my observation, and is the extreme type of the groove. This is a bicuspid, and had been filled many years previously, the cusps having been restored by gold contour, and the root-canals filled with gold. The subsequent erosion destroyed the labial surface of the tooth, grooving it out until the gold in the canal is fully exposed, showing relatively as indicated at *a* in the illustration. Recession of the gum allowed the erosion to include a part of the root.

The above classification of erosions perhaps cannot be considered as absolute. Erosions vary so much that it might be difficult in some instances to say to which of these types a special case should belong. Nevertheless, what I have described are distinct types, notwithstanding the fact that they may be fused the one into the other.

That they are attributable to different constitutional disturbances is doubtful, as they may all occur in the same mouth at the same time.

Nevertheless, I feel safe in the following statements. The first condition frequently ceases to spread; that is, erosion stops. This is probably due to an alteration in the health of the individual. If this can be definitely known, cavities should be formed and gold fillings inserted. Because of the peculiar shape, it is not difficult to determine this point. The procedure is as follows: Burnish a piece of heavy gold foil, No. 120, into the cavity, allowing the edges to extend slightly over the enamel borders. Then fill with oxyphosphate mixed stiff enough so that in pressing it into place the gold will be more thoroughly adapted to the cavity. When this is set, remove it, and keep it for reference. Fig. 180 makes the method more intelligible, the relation between the phosphate and gold plug, *a*, and the eroded part, being plainly shown. If a year later this plug exactly fits into the cavity of erosion, the disease may be considered cured, and a gold filling is indicated. When it is here admitted that the erosion has not spread in a year, the question may be asked, Why fill at all? The answer is, that though I should wait a year before deciding, I should not neglect to have the patient report during that period. It frequently occurs that after erosion ceases, true caries attacks the point, which is readily understood, since a good lodging-place for *débris* is afforded. Hence the necessity for filling.

FIG. 180.



In the second class of cases, one must feel that interference by filling can accomplish only one thing. By covering up the eroded surface further erosion may *widen*, but cannot *deepen*, the cavity. If the operator shall decide that this is sufficient gain, it may be accomplished with oxyphosphate as well as with gold, and with less trouble. The final result, where the disease is not checked, will generally be a necessity for artificial crowns.

The groove variety, I think, is more slow in its progress than either of the others. I usually do not fill them until they are deep enough to appear like cavities, when I insert gold, expecting the fillings to be lost in time, explaining the fact to the patient. I have seen such work last so well, however, that I am inclined to believe that it has the advantage of making a slow disease even slower in its destructive action. The formation of all these cavities would be similar to those occurring from caries, which will be described later.

Green-Stain.—Green-stain is a discoloration or stain, greenish in color, found upon the labial, buccal, and occasionally upon the palatal surfaces of teeth. In the mouths of uncleanly persons it would be difficult, perhaps, to indicate a more direct cause than the constant contact of putrefying food. In the mouths of those who would claim to be of cleanly habit, I think I can explain more exactly the presence of this dangerous stain. First, it is to be observed that *the stain is more common upon the teeth of children;* and secondly, that *it will be found more frequently upon the upper than upon the lower teeth.* Both of these are clinical facts which harmonize with my theory. If we pour milk from a glass, we observe that the surface of the glass is left smeared with an oily residuum. Necessarily the same must occur when one drinks milk, allowing it to flow over the enameled surfaces of the teeth. Children drink more milk than their elders, which explains why the green-stain is more common with them ; and as the tumbler or cup is placed to the mouth, the edge rests upon the lower lip, which in turn covers and protects the lower teeth, so that the fluid passes into the oral cavity flowing more freely over the upper teeth than the lower. Thus we should anticipate the stain more often above than below. It is my belief that the fermentation of this residuum from the milk, which adheres to the enamel, produces the green-stain. I have adopted this theory after many years of inquiry, during which I have found more than ninety per cent. of those exhibiting the stain, whether children or adults, admitting that milk formed a large part of their diet. Moreover, I have in a way proved the theory, by having such patients promise to cleanse the teeth thoroughly with brush and hot water after their milk, the result being that the stain has not recurred where the advice has been followed. This I think a sufficient connection between the two as cause and effect, though I do not make the claim that green-stain may not be possible as a consequence of other ferments.

The chief point of interest in connection with green-stain is that, unlike other deposits upon the teeth, this one almost invariably acts destructively. If removed with a rubber disk and pumice-powder, the enamel will be found chalky in color and consistency. Fig. 181 shows a central incisor from which the stain has been removed, the stippling at *a* indicating where the enamel is found decalcified. If taken in time, this will be so superficial that it may be stoned away with a corundum, without penetrating to the dentine, in which case it is advisable to follow that course, and then highly polish the enamel. Later, the underlying surface will be found as in Fig. 182, where we see three small cavities surrounded by an area of decalcification, as indicated by the stippling in the illustration. There is nothing to be done here except to unite the cavities, removing all of the defective enamel, and fill with gold. Fig. 183 is introduced to show how great devastation may be occasioned by green-stain, and is a case from practice, found in the mouth of a miss of ten. This is a central incisor in which a large, irregular cavity appears in the center of the labial face, the boundaries of which, however, do not limit the destruction, the stippling again indicating an area of decalcification. In the mouth in question both centrals were thus injured, and similar though smaller cavities were found in both laterals and both cuspids. The pulps being alive, it was thought best to fill these teeth with gold, notwithstanding the consequent disfigurement. This was an extreme case, yet by thorough attention to the directions as to the care of the teeth, and perhaps more especially because of the abandonment of the excessive use of milk, the teeth have never since been stained, and the fillings are still in good condition, though ten years have passed and the young woman is now herself a mother.

Whilst the lower anterior teeth are more or less protected during the drinking act, this cannot be said of the molar region. The fluid, once in the mouth, flows freely over all the posterior teeth ; and it is along the buccal surfaces of both upper and lower molars that green-stain plays the saddest havoc. It is unfortunately not uncommon to find what at first seems to be a small cavity, the apparent walls of which, however, will be so thoroughly decalcified that they are readily broken down with an excavator. Where this is the case, it is well to first remove the green-stain with a corundum, and thus be enabled to determine what is the real limitation of the destruction. Starting with a small cavity, extension which removes all decalcified structure may result in a cavity which almost, if not quite, encircles the tooth near the gum-margin. I have seen the entire buccal surface so destroyed, with narrow extensions reaching the palatal surface around both approximal sides. These cavities will often prove most exasperating, and their successful filling is doubtful unless one can be assured that future attacks of green-stain will not supervene, which of course is difficult.

FIG. 181.

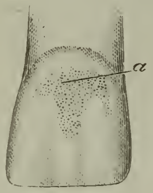


FIG. 182.

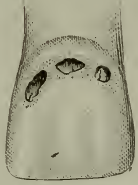
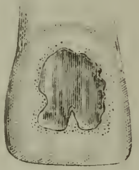


FIG. 183.



True Caries.—Caries may produce surface cavities on any of the teeth, though I have never seen such a cavity in the lingual surface of the lower incisors.* It may follow the depredations begun by erosion, or by green-stain. It may occur in the grooves formed by abrasion after recession of the gum, at the tooth-neck. It may result from malformations, which have made crevices where we should have perfectly smooth surfaces. But most commonly we will find the typical festoon cavity in the anterior teeth, and buccal cavities in molars.

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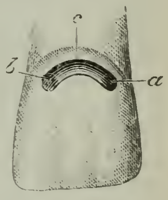
*Since writing the above, a girl of ten presented with a distinct cavity involving only the lingual surface of an inferior lateral incisor.—THE AUTHOR.

In Fig. 184 is shown the usual festoon cavity as it will be found in the central incisor. The retentive formation has been sufficiently described in Figs. 13, 14, 15, 16. This is a cavity which out of the mouth would be most readily filled, but because of the fact that the upper border is often at, or under, the gum-margin, will be found most trying. Where the gum-border so covers the cavity that it would be impossible to apply the dam successfully, the procedure is to pack a roll of cotton under the free margin as tightly as possible, and then fill the cavity with gutta-percha, so that the cotton will be kept in place. In twenty-four hours the gum will have yielded sufficiently to allow the placing of the dam. Or where the tooth is of favorable shape, fill the cavity with gutta-percha, and slip a ring, cut from rubber tubing, over the tooth and force it under the gum.* This will produce the same result, but should never be attempted without warning the patient that in case she should be prevented from returning at the next appointment, this rubber ligature must be removed, else there would be danger of serious injury to, if not loss of, the tooth. Festoon cavities in the incisors and cuspids of both jaws should be filled with gold wherever possible, and it will be possible in more cases as the dentist forms the habit of making the endeavor to place gold instead of the less reliable, though more manageable, plastics. Where the cavity is excessively sensitive, it may be well at times to fill with gutta-percha, probationally; but within six months, at most, the gold should replace the temporary filling. I have no faith in oxyphosphate or oxychloride in this situation, except for the most temporary purpose,—as, for example, supposing that the regulation of a set of teeth be desirable without delay, and the fixtures would interfere with gold filling. It may be well to fill with oxyphosphate until the regulation has been completed and the opportunity occurs to place gold.

A handsome gold filling is less frequently seen at the festoon than in other positions. The cavity itself being easy to fill, this proves how much the proximity of the gum interferes with success.

Taking such a cavity as is shown at Fig. 184, the dam must be placed, and a clamp arranged so that the upper margin is freely exposed to view. Begin by filling the distal retaining pit at *a*, and then fill the opposite one at *b*. Next select a pellet long enough to reach from the gold at one side to that at the other. Fasten at both ends, and then pack it against the upper wall *c*, which reference to Fig. 15 will show has no undercut. The absence of an undercut allows the use of a foot-plugger, and the pellet may be packed against and over the upper border. A second and third pellet similarly packed will avoid the danger of slipping of the clamp. Besides, by this method the most important part of the cavity is filled early, before any moisture may have crept in, and the continuance of the filling is made easy. For this, heavy foil should be relied upon exclusively, and fine points with a hand-mallet make the densest filling.

FIG. 184.



The most difficult festoon cavity is such as is shown at Fig. 185, where we see a cuspid, the root of which has been exposed by the recession of the gum, and subsequent caries has encroached upon it to the gum-margin. Because of the extensive recession at the labial side, with possibly no recession at the palatal, it will be difficult to fit a clamp so that it will not slip. With one or other of the various forms, however, it may be done. The retentive arrangement is different here. It consists of extensions at *a*, *a*, as before, but less deep. Grooves are to be made along the borders *b*, *b*, growing shallower as they meet at *c*. The filling is begun in the distal pit, and extended along one groove toward the point *c*, then down the next groove, and into the opposite pit. Then, starting at *c*, pellets may be employed to cover the floor, building across from groove to groove until the bottom of the cavity is completely covered. Then resort to heavy foil, and work from the point *c* toward completion. Use fine points and the hand-mallet, to obtain the densest surface. Perhaps I should explain why I prefer the hand-mallet to the engine or electric mallet in these cavities. It is because the best results are attainable with these power-mallets only when a rest for the hand holding them can be had. When working in the crowns of the superior teeth, the hand rests upon the chin. In the lower jaw the power-mallet is less convenient, yet a finger of the left hand may usually be made to serve as a rest or guide to the mallet-point. This is still more difficult in festoon cavities, for which reason I recommend the hand-mallet. The others will make good fillings where the operator has acquired the skill to manage them, but where he finds their use awkward he will probably get a poor result if he persists in using them with the erroneous idea that they make better fillings. Once more I say it is not the instrument, but the man, who accomplishes success.

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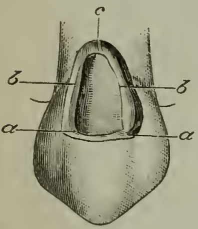
* See page 807, vol. xxxiii.

Fig. 185.



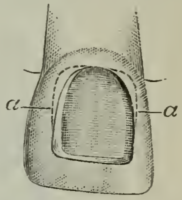
The preparation of festoon cavities in bicuspids does not vary from that in the cuspids. In the superior jaw they should, in my opinion, always be filled with gold; but in the lower, though gold is preferable, a properly placed and properly polished amalgam filling will do good service.

Where a festoon cavity is connected with an approximal one, the former should be filled first. In these cases, build the gold well up along the gingival border, so that when the clamp is removed to allow access to the approximal cavity, the dam will not slip down. A ligature may then be applied, and, forced above the gold, will easily be tied securely so that all will be kept dry. Where, however, it is decided to fill the approximal cavity with amalgam, the reverse order must be followed. The amalgam must be placed first, and thoroughly polished at the next sitting, when gold may be placed in the festoon, the part which is to be readily seen.

Before leaving festoon cavities, I may mention that on more than one occasion I have seen eight or ten such cavities occur suddenly in the mouth of a person suffering from an acute attack of gastritis. They are also common in connection with a chronic gingivitis, and fillings in such teeth will fail unless the gingivitis is properly treated and cured. Again, there is a species of deposit found in the mouths of persons who may be scrupulously cleanly, which seems to have the power of producing caries. This deposit is most often seen at the labial festoon of the lower anterior teeth. It is whitish, and of a creamy consistency. After properly filling the teeth, the patient's attention should be attracted to this condition, and special brushes recommended, the bristles of which will reach and cleanse these places. Without this precaution the best filling will fail.

Cavities upon the labial surfaces are rare, and mainly due to a malformation, which either produces a crevice, or else poorly calcified enamel. The depredations assume all manner of irregular shapes, but two rules cover them all. Where the cavity is single, prepare it approximately circular, or with the borders of the best curve which will include all of the carious region without unnecessary enlargement. Secondly, where there are two or more small cavities, they are not to be united except they be so near that, filled as a single cavity, the gold will not be more conspicuous than where each is treated separately. (See Figs. 21, 22.) A single illustration will suffice to show the method of management. In Fig. 183 was shown an irregular-shaped cavity surrounded by decalcified enamel. Fig. 186 shows the same prepared for filling. To accomplish this, first use a fine corundum over the surface, removing all of the decalcified territory, which is so superficial that after grinding it away the underlying enamel may be polished. This will leave a clear indication of what the limits of the cavity necessarily must be. The next step is to take a sharp excavator, and with a scraping motion remove all of the chalky substance. This will leave the outlines even more clearly defined. Now a sharp rose bur may be used in the engine, and a slight groove made around the whole extent of the cavity. This groove, however, is not at first made in the nature of a retainer or undercut, but is rather to perfect the edges and curve of the border. With the same bur all caries may be cut from the cavity, if any has been left after the use of the excavator. The groove must next be deepened in order to acquire retentive shaping. This is done laterally only, and in a direction sufficiently oblique that the pulp shall not be endangered. The dotted lines at *a*, *a* show the manner of extending the grooves, and indicate that the deepest points are farthest from the incisive edge. Along the incisive border of the cavity no undercutting is to be attempted; but the original groove must have been deep enough to produce a distinct shoulder here, and avoid anything like a bevel. This also must be true of all edges, which are to be at right angles to the labial surface, and not beveled. This can be better explained by showing a sectional view of the right and the wrong way to treat this cavity. Fig. 187 shows a section through a central incisor, in which the cavity has been properly shaped. At *a*, *a* is seen the deepest part of the retaining groove, and its relation to the pulp and to the orifice of the cavity can be noted. At *b*, *b* are shown the right-angled edges. In the same kind of cavity, in Fig. 188, the edges, *b*, *b*, are prepared with a bevel. By this method it is plain from the figure that the retainers, *a*, *a*, are weaker than in the other, whilst it is also true that the thin edge of gold which will be the result will eventually turn up and break, so that the borders of the filling become defective and leakage follows. Moreover, in polishing, the

FIG. 186.



result pictured in Fig. 47 would easily occur. To fill this cavity with gold, use pellets in one groove and then in the other. This done, build across, uniting them and covering the floor with heavy foil, with which complete the filling. Care should be used not to proceed too rapidly, so that thorough condensation may be had, as well as perfection of border. It is a pleasure, when such a filling is placed, to be able to polish it like a mirror, and have the borders so well made that even under a strong magnifying glass they appear as fine as a hair. This will rarely, if ever, be possible where the beveled edge is depended upon.

Fig. 189 shows a curious cavity which occurred once in my practice, and I introduce it because the method of management will be instructive. This cavity originated in one of those pits which are not uncommon upon cuspids, and which result from malformations. It presented as a small but distinct cavity. On preparing it, to my surprise I noted that, however deep I went, the bottom of the little pit still showed as a black spot. Using a mouth-mirror, I examined the palatal side, and there found a corresponding pit, at a point exactly opposite to that on the labial face. Further exploration disclosed the fact that caries starting in each had met, so that when removed there was a hole completely through, from the labial to the palatal surface. Here was a cavity without any bottom to it. The dam being in place, I stopped up the palatal orifice with oxyphosphate, which I allowed to set hard. I then filled the cavity in the labial face, after which I removed the oxyphosphate and completed the filling from that side, succeeding in obtaining cohesion for my first pellet with the gold packed from the other side, so that when finished there was a solid gold filling from side to side. This idea, conceived in connection with this particular cavity, has been useful in many directions. I have elsewhere alluded to it.

FIG. 187.

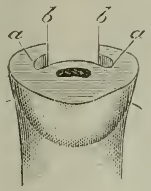


FIG. 188.

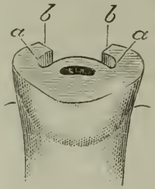
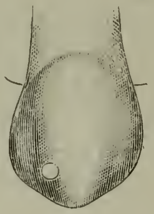


FIG. 189.



The common cavity at the palatal aspect of the anterior teeth is simple enough, except that great caution is necessary to prevent injury to the pulp. This cavity may be met in either central, lateral, or cuspid, but will most often be found in laterals, occurring in the sulcus. Its preparation is best shown by a sectional view such as Fig. 190, where we see how near any cavity at this point must approach the pulp. I prefer a small rose bur to open the cavity, but any soft decay which may be present must be removed with small spoon excavators. As soon as the limits of the cavity are reached, it will probably be found to be of retentive shape; but if not, extension must be carefully attempted, and must be directed parallel to, or away from, the walls of the pulp-chamber, as seen in the figure. I have seen a palatal cavity neglected till it presented as shown in Fig. 191. If we look at this from a sectional view, as in Fig. 192, we see at once that the pulp is in danger. Nevertheless, this cavity is quite similar to that shown in Figs. 186 and 187 as occurring on the labial surface. As in that case, grooves may be made laterally at *a*, *a*, escaping the pulp. But, unlike the labial cavity, these grooves can be connected in the palatal cavity, because of the fact that on this side there is a bulge which permits this procedure in safety. The retaining groove, therefore, becomes a horse-shoe, as indicated by the dotted lines *a*, *a*. As in the labial cavity, a slight shoulder must be formed toward the incisive portion, in order to avoid a bevel, and so assure a good border to the gold. The same cavity in a cuspid is much simpler. After forming the groove, deep extensions may be made at the gingival angles, owing to the fact that there is a sufficient amount of tooth-substance to make it safe to form strong anchorages. There is another difference between the labial and the palatal cavity, which must be noted. Of two cavities having the same depth, the palatal will reach nearer to the pulp than the labial. This is because the labial surface is convex, whilst the palatal is concave. Consequently in palatal cavities it is often wiser to adopt the oxyphosphate method of starting the gold filling. Where this is done, the gold is pressed into the mass of oxyphosphate toward the incisive edge. When set, the oxyphosphate is removed from the retaining grooves and the gold extended into them, thus securing the filling without special dependence upon the adhesive property of the plastic, which is inserted as an insulator.

FIG. 190.

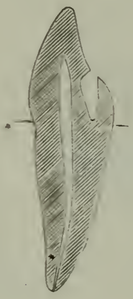


FIG. 191.

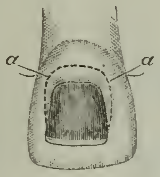
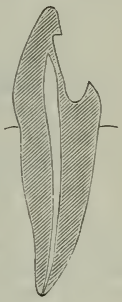
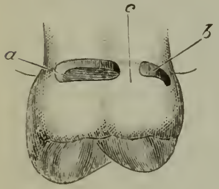


FIG. 192.



A lingual cavity in the bicuspids or molars is a rarity, and, when found, usually extends along the gum-border. In nine cases out of ten an ill-fitting clamp has caused the mischief. The lingual surfaces of almost any of the lower teeth may almost be said to be exempt, save where the clamp induces decay. This is perhaps because the tongue and fluids of the mouth keep the parts washed and cleansed. Nevertheless, I have seen long, narrow cavities, partly under the gum, all along the lingual surfaces of lower molars. Their preparation may require that they be packed with cotton for a day, in order that the gum may be forced away. This accomplished, a rose bur which will cleanse the cavity of decay will usually leave it retentive in shape. If not, a slight extension at each end is all that is needed. Here is a place where I might almost say gold should never be employed. To insert a perfect gold filling in such a position, with all the obstacles offered by situation, saliva, and presence of the tongue, would require extraordinary ability, and even then would be accomplished at an expense of time and pain that scarcely excuses the effort. An amalgam filling, on the contrary, may be placed with rapidity and ease, and if properly polished afterward will serve all purposes.

FIG. 193.



In the superior jaw similar cavities are more common, and at the same time less difficult. I will introduce here a case from practice which offered unusual features. Fig. 193 shows a first molar in which is seen a narrow cavity, *a*, along the palatal side near the gum, whilst a second cavity, *b*, appears at the palato-approximal angle. At first glance one would naturally say that they should be connected and filled as one cavity. This I could not do, for the reason that there was great difficulty in placing the dam. The twelfth-year molar had not sufficiently erupted to retain the clamp, which therefore was necessarily placed over the affected tooth. Again, this tooth was so conical, and both of the cavities were so near the gum, that I found it impossible to place the dam and tie a ligature before placing the clamp. Neither did I succeed in tying a silk around the tooth after placing the clamp. As a consequent result, I found that though I could force the dam back with the clamp so that I could fill either cavity, moisture would leak in through the other. In this dilemma I filled the cavity *b* with gutta-percha temporarily, then placed the dam and filled the cavity *a* with gold, subsequently filling the other. I filled these cavities with gold, for the reason that the teeth were excessively sensitive, and the young man was obliged to wear an obturator, which needed clasps to hold it in place. I felt satisfied that, if filled with amalgam, the gold clasps in contact with amalgam in this special instance would prove mischievous. As I decided to fill the two cavities separately, I could not form any extension in either at the end near the slight separation of dentine at *c*, without undermining that point. I therefore made an extension at the opposite ends in each, and formed slight undercuts along the length of the cavities. In each case the first pellet was packed into the pit at the end, and the gold built forward toward *c*. The patient was tipped back so that I could get direct view of the work looking across the mouth, the tooth being upon the left side. These two fillings were placed three years ago, and though a fixture with clasps has been worn constantly since, no annoyance has been reported.

Buccal cavities are difficult or simple in proportion as they are large or small, sensitive or otherwise, and near to or distant from the gum. The simplest form is the small, almost circular cavity found in the buccal sulcus, oftener in the lower than in the upper teeth. Their preparation is easy, necessitating the use of a rose bur which will not quite enter the orifice, thus shaping the borders at once as it is pressed through into the dentine. The removal of all carious material, and a slight internal enlargement, will suffice where amalgam is to be used. For gold, I should make slight extensions obliquely in opposite directions; this not so much as a retentive precaution as to facilitate filling, since the cavity so formed will be more readily managed than one which is perfectly regular and round. There is a strong temptation here to wedge in a few large pellets, burnish, and call the tooth filled. The true method is to use small pieces here as elsewhere. I should choose gold for all such cases, except where the youth of the patient might make it advisable not to impose a lengthy operation ; then use amalgam, explaining that gold will be inserted later in life.

Where the sulcus is well marked it should be cut out, the cavity being extended toward, but not necessarily into, the crown. This will produce an oblong filling. The retentive formation in such cases would be an extension toward the gingival end of the cavity and lateral, but slight undercutting, effected with a wheel bur. There should be no undercut toward the crown, lest by weakening that point fracture result under the forces of mastication. Larger cavities may be met, of all conceivable shapes. There may be two, or even more, distinct cavities in the buccal surface of a single tooth, and in each instance the operator will be called upon to connect them or fill each separately, as his judgment shall dictate. The main fact will be to determine whether the fillings will be better retained separately, or in one cavity. Fig. 194 presents a good study. Three cavities are seen in the buccal surface of a molar. The smaller one, *a*, is in the sulcus, and quite near it is another, *b*, extending along the gum-border. At *c* is a third, which almost encroaches upon the approximal surface, being near the angle. Here it is plain that if in cavity *a* my instruction to make a retaining extension at the gingival end were obeyed, the drill would emerge within the cavity *b*. True, the smaller cavity could be filled, depending alone upon lateral undercutting ; but when cavity *b* is similarly prepared it would be found that the separation between the two would be extremely frail. Here, then, it would be best to unite and fill the two as a single cavity. Cavity *c*, however, is distant, and in sufficiently sound territory to permit of filling it separately. Fig. 195 shows the tooth prepared for filling. The dotted lines *a*, *a*, indicate the retaining extensions depended upon for the larger cavity, whilst in the smaller there is merely a general undercut, slight toward the crown, and deep enough toward the gingiva to allow the first pellet to be wedged securely, if gold is to be used. The choice of gold or amalgam might depend, as before, upon the age of the patient, or it might be decided in accordance with the difficulty met with in placing the dam, and the amount of moisture.

FIG. 194.

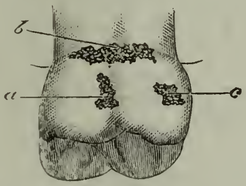
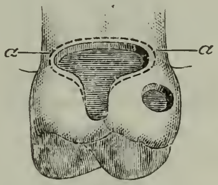


FIG. 195.



The general arrangement of the larger cavity in Fig. 195 is the one to be depended upon in all ordinary buccal cavities. This is, extensions at the anterior and at the posterior gingival angles, with grooves following the other borders, decreasing in depth as the crown is approached. This applies more particularly to cavities resulting from true caries. Those found under green-stain will be much more perplexing. To illustrate, I will give two examples. The first is seen in Fig. 196, where, the stain having been removed, we find three small cavities along the gum-border, whilst the enamel between and around them is more or less decalcified, as indicated by the stippling. The preparation of this necessitates the free use of a bur, forming a single cavity which will include the entire affected area. This may result in an oblong cavity along the gum-border having nearly parallel borders. More commonly, however, the enamel will be found softened toward the crown along the sulcus, so that, when prepared, the cavity will be approximately shaped like the larger one in Fig. 195. A most disheartening condition is where, whilst extending the cavity in the direction of the decalcified territory, it is found that one or both approximal surfaces have become affected. The rule, however, is not to be relaxed, even though the procedure as directed will lead the dentist entirely around the tooth, thus forming a cavity completely encircling it. This occurred to me once, and I found much difficulty in placing amalgam, until I hit upon a method which led me out of the dilemma. The difficulty was that after packing the amalgam into the posterior approximal part of the cavity, thence into the buccal, and so around into the anterior approximal, as soon as I endeavored to fill the palatal part I found myself dislodging that already packed. Add to this the inroads of moisture, because of the fact that I was obliged to depend upon the napkin, and it is seen that the amalgam, becoming wet, could not properly be forced back into place. I tried beginning at different points, but invariably when I came to completing the circle, dislodgment resulted. Finally I succeeded thus: I fashioned a band of German silver, somewhat wider than the cavity. I began by filling the palatal part of the cavity, packing the material part way into the approximal portions. Next I placed my band in position around the tooth, covering the amalgam already in position, and allowing the two ends to extend forward between the adjacent teeth. Around this band I placed waxed flax thread, the ends lying loose. The condition at this point is shown in Fig. 197, which gives the buccal side of the tooth still unfilled, the relation of the band and flax being seen. The filling was continued from the posterior approximal part around into the buccal, when the band was bent down over it. Then the anterior part was similarly treated. When both ends of the band were thus turned down, the flax was tied, securely holding the band in place, whilst as it was drawn tight it compressed all the amalgam into the cavity uniformly and simultaneously, even forcing out a slight sur-

Fig. 196.

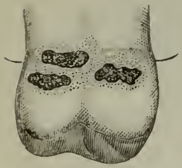
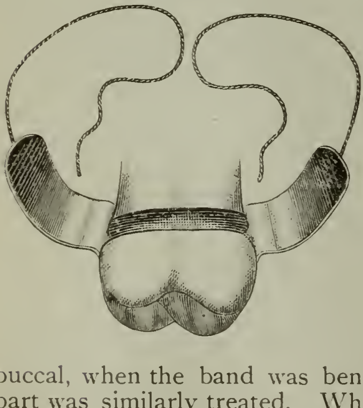
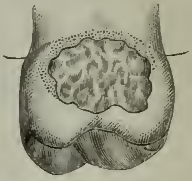


Fig. 197.



plus of mercury. This was left in position until the next visit. Since then I have frequently resorted to this method of tying a band around an amalgam filling where similar conditions existed, even though they have been less extensive. It is a good precautionary measure where amalgam is placed in a large but shallow buccal cavity, as well as in many other conditions of anomalous shape, where, after filling, there might be danger of fracture before the mass has hardened.

FIG. 198.

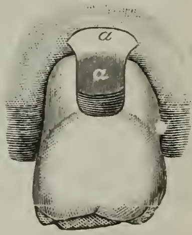


The second type of cavities found in connection with green-stain is where the entire surface seems more or less decalcified. Fig. 198 gives an extreme case. Where the depredation is less, so that the crown is not so nearly approached, the borders are simply to be formed into regular curves, and the retaining arrangement will be the same as in Fig. 195, *a*, *a*. Where the decalcification has been as great as shown in Fig. 198, it will generally be wiser, if not actually necessary, to extend the cavity into the crown, and then form a groove under all borders. In many instances this will be made simpler by the presence of a filling in the crown, which can then be removed.

Only in the smallest buccal cavity, found under green-stain, would I attempt a gold filling. With the larger, and especially where the gingival border passes beneath the gum-margin, I prefer and advise amalgam. An alloy which has a percentage of copper in it has done better service in my practice than any other. No filling, however, will endure, if green-stain supervenes, as the enamel around it will be readily attacked and destroyed, as in the first instance.

There is one other kind of cavity which I promised to describe, though not strictly a surface cavity. In fact, it may scarcely be called a cavity at all, being, if anything, two cavities.

FIG. 199.



In the mouths of old people, recession of the gum not infrequently progresses to an extent which would seem to menace the tooth. So much of the root is exposed to view that it is marvelous that the tooth should not be loose. Yet often we find such teeth quite firm, although in the molar region the recession has been so extensive that the bifurcation is plainly in view. As a result of this, a lodging-place for food being afforded, occasionally caries attacks the inner sides of the roots, until the pulps being approached some pain is felt, and the patient comes in for relief. Any endeavor to prepare separate cavities in each root would be unwise, for even if successfully filled the space between the bifurcation would continue to act as a repository for *débris*, so that caries would recur. I treat this space as though it were a cavity, simply removing as much caries as possible, when a naturally retentive shape will result. Where the gum is irritated so that it bleeds easily, I like gutta-percha, and prefer the pink to the white. Where the gum is firm, and the pulps not exposed, or else dead, I fill with amalgam. My method is to cut a piece of clean tin-foil of such a shape that it can be placed between the roots, covering the gum, thus forming a floor against which to pack the amalgam. When the filling is in, the projecting end of tin is turned up and burnished into the amalgam. In Fig. 199 we see the space between the buccal roots of a molar, and at *a* the tin-foil.

TEMPORARY FILLINGS.

Passing from permanent, I may profitably discuss temporary fillings. By temporary filling I do not mean a probational filling. The latter term should imply a filling placed in a tooth where some doubt exists as to the advisability of inserting a permanent filling of metal. It is therefore usually of oxyphosphate or gutta-percha. Whilst in a measure intended to serve a temporary purpose, the fact that the tooth is in a doubtful condition of health renders it imperative that the filling should be placed securely and thoroughly, so that it may remain undisturbed as long as possible, thus affording the tooth ample time for full restoration to such a state of health that it will no longer be doubtful whether the final filling of metal may be inserted.

Temporary fillings, then, are those which cover dressings placed within a cavity for medication; or those inserted to tide over a few days until more convenient to fill; to force the gum away from cavity-borders, or for similar strictly temporary purposes.

The man who indifferently packs in a temporary filling, with the idea that "it is only for a day," leaving surfaces rough and edges overlapped, is a sloven. Moreover, he is careless of the comfort and interests of his patient. Nowhere is the axiom truer that if a thing is worth doing it is worth doing well.

The most important temporary fillings are those which cover arsenical dressings. Arsenic which is not thoroughly sealed within a cavity may cause serious damage, the more so as it must be allowed to run its course, which may involve the entire bony socket of the tooth, so that the tooth itself is finally lost.* The first caution, therefore, is to observe that where a cavity presents partly filled by hypertrophied gum-tissue, arsenic should not be applied at the first sitting, unless special reason should make it essential, and no need of such haste would excuse the procedure unless the hemorrhage consequent upon the removal of the hypertrophied tissue could be absolutely controlled. Ordinarily a sharp lancet should be used for removing this excessive growth, and a saturated solution of nitrate of silver very carefully applied to the remainder. A dressing carrying some medicament which will act soothingly upon the aching pulp should then be applied, and this covered with a temporary filling. I may as well say at once that sandarac varnish on cotton is a filthy combination to place in the mouth. In a few cases it will serve better than anything else, but in the great majority of instances it can and should be dispensed with. Its main advantage is when it is desirable to force resistant gum-tissue away from a cavity-border, when usually it will serve the purpose perhaps better than more cleanly fillings.

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* Where serious results obtain from poisoning the gum with arsenic, the treatment is to dress the part locally with tincture of iron (*Tinctura Ferri Chloridi*), and to administer internally the hydrated oxide of iron (*Ferri Oxidum Hydratum*), or better still, the same preparation with magnesia (*Ferri Oxidum Hydratum cum Magnesia*).

In the case above described I should use the temporary stopping furnished at the depots, which is a combination of gutta-percha and wax. This is to be had of two colors, pink and white. For teeth which will peremptorily need attention at the next sitting, use the pink, whilst when a point is reached where the tooth may be allowed a few days' rest, use the white. In this way the dentist can tell at a glance from the color of the temporary stopping whether the tooth requires immediate attention, or whether it may be passed whilst others are filled.

In the case being discussed, then, the pink stopping would be used. At the next sitting this would be removed, as well as the cotton under it, and it would be found that the gum would be in such a condition that arsenic could be inserted. I will pause here to state that I am not discussing the advisability of using arsenic, but am simply telling how to use it where the dentist does depend upon it. The arsenic being placed carefully upon the point of exposure of the pulp, the temporary stopping must be made so soft that it can be placed without undue pressure. If it seems doubtful that this can be accomplished, it will sometimes be better to use wax, which can be made much more plastic. There is one point to be emphasized. Where the exposure is in connection with an approximal cavity, care must be observed that the temporary stopping is not crowded below the gum, as this will often cause more pain than that experienced from the arsenic. With warm burnishers this filling should be trimmed to proper shape, and made thoroughly smooth. It should approximately restore contour, and should not be so full that it would interfere with occlusion. Often when the cavity is of poor shape, the burnisher may be made so warm that it slightly melts the stopping, when if passed along the borders all around, it will compel the adherence of the material.

There will occur cases where the cavity is of such a nature that though the dentist desires to use arsenic, he will recognize at once that, if covered with temporary stopping, the dressing will most probably be displaced. The procedure in these cases is to have the parts as dry as possible, with dam or napkin as is most feasible, and after applying the arsenic, cover with a thin oxyphosphate, which, adhering to the cavity, leaves an assurance of safety. The cavity can be shaped properly for retaining the permanent filling, of course, the trouble in the first instance being that excavation whilst the pulp is aching would be painful.

After the removal of a pulp, or where the pulp has been dead for any length of time, so that the cavity is necessarily deep, especially in molars, the temporary filling need not be exclusively of temporary stopping. In large approximal cavities, considerable cotton may be placed over that which carries the medicine, and only the outer part covered with the temporary stopping. This renders subsequent removal less troublesome. Again, where a large opening in the crown is present, in addition to a fair proportion of temporary stopping, it will be well to use gutta-percha for the exposed surface, as that material will better withstand the force of mastication.

Where it is desired to fill a large cavity loosely, and yet seal it up sufficiently to keep it clean and protected from the ingress of food, cotton dipped in chloro-percha will be found much better than cotton and sandarac. When cotton and sandarac is to be used, as for pressing away resistant gum-tissue, the cotton should be barely touched to the varnish. Then open the pellet, and fold it again so that the sandarac is inside. This will make a more cleanly plug, whilst giving the outer cotton a chance to swell by absorbing moisture.

The Finishing of Fillings.

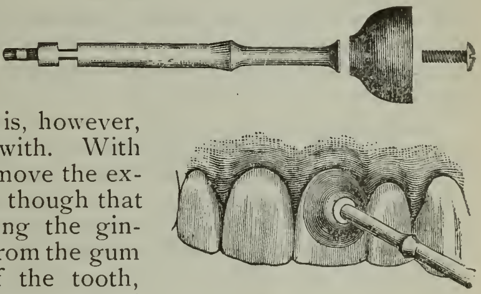
The final success or failure of a filling largely depends upon the finishing or polishing. A number of points in connection with the various materials are of special interest.

Gold.—A gold filling, when dismissed, should appear like solid metal, smooth at every point and highly polished. Unless there is good reason for postponement, the finishing should immediately follow the insertion of the filling, before removal of the dam. Exception to the rule, so far as the removal of the dam is concerned, would be where its presence would interfere with the polishing, or where nothing is gained by leaving it in place. The judgment of the operator would decide. Approximal fillings should be built out so full that after removing the excess the exact contour would be restored, whilst the surface of the gold would be sufficiently dense to permit the highest polish. This requisite at once banishes the matrix. Whether in the anterior or in the posterior teeth, superior or inferior, I like sand-paper for this work, and prefer the disk on the engine-mandrel to the strip, though both will be required to meet all cases. I believe the more common practice is to use the disk with the sand side facing away from the engine hand-piece which holds the mandrel. Occasionally such a position will be peremptorily needed. Ordinarily I recommend that it be placed exactly the other way. With the sand side facing the hand-piece, and sufficient practice to acquire dexterity, the operator will find that he can manage the greatest variety of fillings. I can reach and polish without other instrument the following: Anterior and posterior approximal surfaces of incisors, cuspids, bicuspids, and first molars, and the posterior surfaces of second and third molars; labial surfaces, especially including festoon cavities, and often the palatal surfaces. After the disk has been used a little so that it becomes pliable, I can trim a filling, shaping approximal angles, without flattening. Where the tooth is long, and wide at the crown, I can reach the gingival margin of the filling by pressing the disk against the adjacent tooth, which compels it to run as though concaved. In many inaccessible places I compel the disk to accomplish my purpose by holding it against the part with a flat burnisher pressed against its reverse side. In fact, the disk on the engine in my hands is more useful than any other finishing appliance. I may say here that in spite of the undoubted ingenuity which has been displayed in the invention of disk-carriers, the best for all practical purposes is still the original simple screw-mandrel. Instead of using a screw-driver, however, the disk may be placed or removed by having the mandrel in the engine, and holding the disk whilst the engine is started quickly.

After using a medium grade of disk for taking off the surplus mass of gold, follow with one made from the finest pouncing-paper. This will produce a good polish. Nevertheless, a higher luster still should be attained by use of a strip of chamois well chalked. For this the best material is what is known as "whiting."

I do not like files, either between the teeth or on labial surfaces. In the former they are apt to leave flat planes, and in any event they make scratches, which must be removed finally with the sand-paper, so that the disk may as well be chosen at the outset. Occasionally a file may be needed for making sufficient space in which to revolve a disk or pass a strip; still, even in these cases I prefer a saw, which, having no cutting sides, removes only the rough excrescences which prevent the ingress of the sand-paper. The approximal trimmer is a humane and valuable instrument. Where the cervical margin reaches to or passes the gum-margin, the over-build of gold should be removed carefully with the approximal trimmer rather than with a sand-paper strip or disk, either of which will so wound the gum that not only will it remain in a state of irritation for several days, but frequently recession is induced. This instrument is also essential for the finishing of festoon fillings. In these cases it will often be better to remove the dam as soon as the filling is placed, for the reason that the clamp interferes with the work. With care, a fine finish may be achieved without wounding the gum. This is, however, a difficult place to contend with. With the approximal trimmer remove the excess of gold carefully, even though that may mean slowly, perfecting the gingival margin and working from the gum toward the incisive end of the tooth, thus avoiding wounding the gum and consequent hemorrhage. The gold trimmed to approximately proper proportions, resort to the smallest disks, placed on the mandrel as before directed. Placing the edge of the disk near the gum, slight pressure will cause it to bend, so that as it is revolved it finishes the surface of the gold, the edge of the disk if required even passing under the gum-margin without wounding it. A final polish may be produced with the polishing-powders on soft-rubber disks, or in connection with wood points. The rubber cup, Fig. 200, is invaluable.

FIG. 200.



In the crowns of bicuspids and molars, I like finishing burs and burnishers in the engine when the fillings are small. Where they are of medium or large size I use them first, for the reason that a more thoroughly dense surface is obtained by burnishing. But for a final finish I do not admire the irregular surface left by the burnisher. I therefore depend upon small fine corundums, Hindostan and Arkansas stones, finishing with pumice and chalk, used one after the other on the soft-rubber disk.

Amalgam.—The same general rules of aiming at and obtaining a lustrous polish are to be observed with this much-abused material. The approximal trimmer, however, will not avail, and for this reason the gingival margin should be made as nearly perfect as possible whilst the material is yet plastic. The sand-paper disk will do much along this part of the approximal surface, but will not always reach the extreme gingival margin. Here a fine finishing file having a small end, somewhat similar to the approximal trimmer, will serve well, the final finish being given with a spatula cut from orange-wood, and used in connection with the polishing-powders. In crown and large contour fillings, after using the rubber disk with pumice and then with chalk, nothing makes an amalgam filling so handsome as the use of the small engine brush-wheel, of moderate stiffness, used first with moistened pumice and then with dry chalk. I dismiss this class of fillings resembling a mirror in color and luster, and they keep their handsome appearance a long time, remaining forever smooth, though getting dull in time.

Oxyphosphate.—When used as a permanent filling, this material should be allowed to set thoroughly hard before any attempt is made to trim it to shape, and when shaped a final finish may be made with the pouncing-paper disk, followed by the chamois strip without chalk. The dam being still in place, the filling should be thoroughly coated with chloro-percha, which should be allowed to harden by the evaporation of the chloroform before the dam is removed. If this rule is properly observed, this film of chloro-percha will often be found upon the filling two weeks later. Thus the material has been protected from moisture until hardened to a density not otherwise attainable.

Gutta-percha.—This material is trimmed to shape with warm burnishers, and then quickly hardened by applying cold water. After this, if an examination shows that there is an overlap under the gum-margin, dip floss silk in chloroform, and slipping it between the teeth (supposing it to be an approximal cavity), move it back and forth. This will remove the excess without disturbing the filling, as might occur if the use of heated burnishers were essayed again.

(To be continued.)

THE RIGHT OF APPEAL.

BY DR. T. J. WELCH, PENSACOLA, FLA.

(Read before the Florida State Dental Association.)

MR. PRESIDENT AND MEMBERS OF THE FLORIDA STATE DENTAL ASSOCIATION: I desire to present a few suggestions to this association, which seem to me important and essential in avoiding tyranny and possible injustice to applicants for membership and work within its jurisdiction.

The subject is the relation of the state board and the present law to the applicant who may present himself for examination. It is known to be a fact that sometimes an examiner with a hobby expects too much from the applicant, and the applicant feels that he has been hardly dealt with. You can easily see how in certain cases this may happen. Rejection in many instances may be a just decision; but it often happens that no one can satisfy the applicant that this is the case.

Now, how can this matter be satisfactorily adjusted? I see no reason why it cannot be done as legal questions are disposed of in our civil and criminal courts. Let all the state boards meet some time before the meeting of the National Association of Dental Examiners.

Let it be made part of the duty of the National Board of Examiners to review and decide upon any decision made by a state board of examiners, and either affirming or reversing the same in every case where an appeal may have been taken from the decision of the state board. Let the state laws be so amended as to conform to this practice, and give the rejected applicant the right of appeal in every case where the demand for an appeal is properly made.

To do this effectively, let such changes in the law be made as will make all examinations written ones, both as to questions and answers, the questions selected covering the whole of the curriculum now or to be hereafter taught in the reputable dental schools of the United States. These questions should be pertinent, practical, and scientific, yet so chosen and condensed that the average dentist could write out his answers in four or five hours; the questions to be selected or revised by the state board at each yearly meeting.

By means of this written examination the board can better decide not only as to the professional but also as to the general educational abilities of the applicant, having before it an exhibit of his style of expression and knowledge of the language. The whole can be prepared by the secretary of the state examining board, and in due time the manuscript can be forwarded, in every case of appeal, by the order of the state board, to the National Board. In all such cases the appellant should pay the appeal fee required by the National Board, the said fee to accompany the papers and to be additional to the fee required of all applicants by the state board under the state law.

I feel confident that such a course would elevate the profession, and secure respect for and general acquiescence in the decisions of examining boards, while effectually preventing injustice and partiality in their decisions. It would prevent all implications of unfairness, as the applicant would always have the liberty of submitting the manuscript of his examination to the National Board of Examiners for their final judgment.

If I were a member of a state examining board I should be delighted to know that this was the case, and that any injustice I might unwittingly do would be corrected by the National Board; and, having no desire to take any advantage of my fellow-man, I should always be willing to have my decisions submitted to the National Board for criticism, approval, or reversal.

You can easily see the fairness and justice of this proposition, and you will doubtless find that all reputable schools of dentistry will indorse such action. Why? Because the action of the state board should be public, and subject to appeal as a matter of justice and right, both to the rejected applicant and the college or school from which he received his dental diploma.

There could be no mistake made, as the manuscript of the examination would show the whole transaction. I cannot see a single reason why this should not be heartily indorsed and immediately put in practice by colleges, state and national boards, and all applicants for certificates under state laws. It is unquestionably fair all around, and will stimulate the sense of equity among all colleges, professors, and dental students.

It may be asked, What will be the result in those cases where the National Board should reverse the decision of a state board? I would say that in my judgment the decision of the National Board should be final, just as decisions are in the United States Supreme Court. I do not think any one should fear the decision of the National Board, removed as it is from all local and personal influences, all having only an equal and impersonal interest in the general elevation of the profession.

I make these suggestions in order that others may perfect the plan and help to secure its adoption as a part of our dental law.

CORRESPONDENCE.

DR. WESTLAKE'S CASE OF SARCOMA.

To the Editor of the Dental Cosmos:

Sir,—In response to numerous inquiries, I desire to state through the Dental Cosmos that there is no indication of the return of the sarcoma removed by Dr. Charles McBurney, reported in this journal for September, 1889, under head of "A Giant-Cell Sarcoma and Removal of Superior Maxilla," and September, 1891, "Excision of Inferior Maxilla and Artificial Substitution."

It may be of interest to both the dental and medical professions to note that by the aid of the spring mentioned in connection with the last-named case, the patient has so trained the remaining muscles that she can articulate and masticate without the spring; and as it is of no further use, I have removed the spurs on the gold caps and fitted a partial lower denture with "plumper," so that the outward integument has a fairly normal appearance, the only depression noticed being where the inferior maxilla articulated.

Albert Westlake.

New York, August 5, 1892.

TRANSLATION.

PENTAL AS AN ANESTHETIC.

BY PROFESSOR DR. L. HOLLAENDER, HALLE.

(Translated by William Lombardino, D.M.D., Berlin, Germany.)

(Continued from page 215.)

In my first communication regarding pental, I particularly emphasized that in the narcosis, in most of the cases, neither consciousness nor the active will-power was entirely suspended; further experiments have since shown that this is only the case where the narcosis is not profound, but still of sufficient duration to allow the extraction of three or four teeth.

In very profound anesthesia, to which I have lately carried quite a number, consciousness entirely disappeared, and the active will-power in many cases was entirely absent, so that patients would not open the mouth, which was firmly closed, when loudly told to do so.

To all appearances, this usually happens when the patient resolves to keep the mouth closed as firmly as possible, in order to prevent the dentist from performing the operation too prematurely. On waiting somewhat, the mouth will open of its own accord, since there is no cramp-like contraction of the masticating muscles as is generally the case with bromide of ethyl.

For the reason that it is not necessary to wait for a deep anesthesia, pental possesses a certain advantage over bromide of ethyl and chloroform.

In case of the first substance, it is impossible to perform an operation under incomplete anesthesia, whereas with chloroform it is very dangerous unless complete insensibility is produced ; death even may be the result. Lately I have only been obliged to administer from five to eight cubic cm. of pental to induce anesthesia of sufficient duration. In the clinic, several of my hearers regularly timed the narcosis (something almost impossible in private practice), which was found to begin in from forty to forty-five seconds, but from one to three minutes were required for the production of total insensibility.

Regarding the time when the operation may be commenced, or when the requisite insensibility takes place, and what symptoms prove general insensibility, I am at present unable to say, because in most cases the corneal reflex remains very long, the expression and complexion of the face both remain unaltered, and many patients keep their eyes wide open, in which case the pupil is more or less enlarged.

Generally, at the beginning of the anesthesia there is an apathy or light sleep, while some people stare unconsciously ; others suddenly stretch their feet forward and bend the head backward. Nevertheless, long practice and strict observation of anesthetized patients will soon overcome these few difficulties.

The general good feeling after a gradual return to consciousness is an increased source of astonishment at each new narcosis.

Only a few people maintain that they have experienced a weakness in the knees or feet after recovery, but this feeling entirely disappears after two to three minutes. Apart from this the patients feel entirely normal, and the most of them present a cheerful and pleasant look.

Pental is also more pleasant to inhale than ethyl bromide.

A lady for whom I was obliged to extract nearly every tooth was anesthetized the first time with pental, and the second time, about eight days later, with ethyl bromide, without being informed of the change in the material, and on visiting me the third time she said that she did not inhale the right stuff the last time, and requested me to give her the material used in the first narcosis, as it was more pleasant to inhale and she felt much better after recovering.

In cases of hysterical and very anemic women with whom ethyl bromide disagrees or has no effect, or of those who require considerable chloroform, through which great excitement is caused, pental has never yet failed me.

At the medical clinic of Professor v. Mering, pental was administered with success to several inebriates without producing much excitement.

The latest preparation, which has a boiling point of 38° C., the same as the others, has a less intense odor.

I must add that as pental is very volatile the odor does not remain in the room very long, whereas I have noticed that the ethyl-bromide odor remained in the room all day, and finally assumed a garlic-like smell. I can therefore not only maintain my previous assertion as to the value of pental as an anesthetic for short operations, but can emphasize its advantage above all other general anesthetics.

Of course, at the outset the technic of administering it occasions some little difficulty. Many dentists who, in employing this material, could not produce or else had great difficulty to induce anesthesia, were greatly astonished when they came to my clinic in Halle and satisfied themselves as to the effects of pental, and they quickly found out the mistakes they had made in its administration.

In order to obtain a quiet and slow inhalation, the rubber bulb of the Junker apparatus must be pressed very lightly and not too quickly,—perhaps fifty times in a minute. Through this means the vapor gradually enters the mouth and nose, and from there easily into the lungs. Lately I have advised patients who seem very uneasy to blow strongly in the mouth-piece instead of inhaling ; and, since a strong expiration is followed by a deep inspiration, inhalation goes on very smoothly. It is always beneficial to know such little knacks or tricks, as the manipulation of the material is thereby greatly facilitated ; perhaps experienced operators who work considerably with anesthetics make use of many more.

In operations of long duration, no such good results are obtained with the common inhaling mask, handkerchief, etc., as with the Junker apparatus, which I must again most strongly recommend, notwithstanding that a common mask covered with leather will answer the purpose for the extraction of one or two teeth. Too much pental is lost by other inhaling methods, and it also requires a longer time to induce anesthesia of sufficient duration.

In answer to the many questions as to whether I still cling to my opinion regarding the harmlessness of pental, I can only say that I am now more than ever convinced that we have in pental one of the safest and most harmless anesthetics, which will in the future be of the greatest value to suffering humanity, and in consequence is not only equal but far superior to nitrous oxide. Since my first publication, quite a large number of narcoses have been carried out by different people, who did not possess the least experience, and still all communicated results were in the highest degree satisfactory.

Examinations of the urine of persons anesthetized with pental have disclosed nothing which was in any way deleterious in its action which could be determined by this method.

Very likely, when taken up by the blood, pental is split up into water and carbonic acid, two substances which are in no way injurious under the circumstances.

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PROCEEDINGS OF DENTAL SOCIETIES.

NATIONAL ASSOCIATION OF DENTAL FACULTIES.

The ninth annual meeting of the National Association of Dental Faculties was held at the Cataract House, Niagara Falls, commencing Monday, August 1, 1892.

Twenty-six colleges were represented, as follows:

Baltimore College of Dental Surgery—R. B. Winder.
Boston Dental College—J. A. Follett.
Chicago College of Dental Surgery—Truman W. Brophy.
Harvard University, Dental Department—Thomas Fillebrown.
Kansas City Dental College—J. D. Patterson.
Missouri Dental College, Dental Department of Washington University—W. H. Eames.
New York College of Dentistry—Frank Abbott.
Ohio College of Dental Surgery—H. A. Smith.
Pennsylvania College of Dental Surgery—C. N. Peirce.
Philadelphia Dental College—J. E. Garretson.
University of Iowa, Dental Department—A. O. Hunt.
University of Michigan, Dental Department—J. Taft.
University of Pennsylvania, Dental Department—James Truman.
Vanderbilt University, Dental Department—W. H. Morgan.
Northwestern College of Dental Surgery—B. J. Roberts.
Louisville College of Dentistry—Francis Peabody.
Indiana Dental College—J. E. Cravens.
Northwestern University Dental School—E. D. Swain.
Dental Department of Southern Medical College—William Crenshaw.
Dental Department of University of Tennessee—J. P. Gray.
School of Dentistry of Meharry Medical Department of Central Tennessee College—G. W. Hubbard.
University of Maryland, Dental Department—John C. Uhler.
Columbian University, Dental Department—H. C. Thompson.
Royal College of Dental Surgeons of Ontario—J. Branston Willmott.
American College of Dental Surgery—John S. Marshall.
University of Denver, Dental Department—George J. Hartung.

The *ad interim* committee reported that it had investigated a charge preferred against the University of Maryland, Dental Department, by the College of Dentistry of the University of California, of graduating a person in less time than the rules demanded; that it found that no rule of the association had been violated, and had so reported to the parties in interest; that it had dismissed an effort for the reinstatement of the American College of Dental Surgery, Chicago, as not within the jurisdiction of the committee, with the advice to reorganize the college before attempting to influence the association to change its action, which reorganization has since been accomplished.

The committee also stated that its value in settling such matters had been made so clearly apparent that it recommended that it should be made a standing committee, to be elected by the association, instead of being appointed by the president.

The report was received and placed on file, and the recommendation with regard to the status of the committee was adopted.

The following resolutions, laid over from last year, were adopted:

Resolved, That in case of charges against any college no final action shall be taken until all parties concerned shall have at least thirty days' notice.

Resolved, That at all future meetings of the National Association of Dental Faculties the delegates shall consist of members of faculties, and demonstrators will not be received.

The following resolutions, also over from last year, were laid on the table:

Resolved, That after June, 1893, the yearly course of study shall be not less than seven months, two months of which may be attendance upon clinical instruction in the infirmary of the school, now known as intermediate or infirmary courses.

Resolved, That after the session of 1892–93, four years in the study of dentistry be required before graduation.

The following resolutions lie over under the rules:

Offered by Dr. Winder,—

Resolved, That hereafter graduates of pharmacy be placed on the same footing as graduates of medicine, and be entitled to enter the second-year or junior class, subject to the examination requirements of each college.

Offered by the executive committee,—

Any college failing to have a representative present for two successive sessions without satisfactory explanation shall be dropped from the roll of membership of this association.

The chair, having been asked for a ruling upon the admission of graduates of pharmacy to the junior class, decided that under the rules they could only be admitted to the first-year or freshman class.

The executive committee offered a report recommending the restoration of the American College of Dental Surgery to full membership, which, after an explanation by Dr. Marshall of the reorganization of the college, was unanimously adopted.

The executive committee reported on the application of the Western Dental College, of Kansas City, recommending that it lie over for another year. The report was adopted.

The report of the executive committee recommending the rejection of the application of the Tennessee Medical College, Dental Department, of Knoxville, Tenn., for irregularities in conferring the degree of D.D.S. and in the reception of students, was adopted.

The application of Howard University, Dental Department, Washington, D. C., was laid over for another year.

The following applications for membership, also reported by the executive committee, lie over under the rules:

United States Dental College, Chicago.

Homœopathic Hospital College, Dental Department, Cleveland.

Detroit College of Medicine, Department of Dental Surgery.

The report of the executive committee recommending that the Baltimore College of Dental Surgery be censured by the association for conferring the degree of Doctor of Dental Surgery upon Charles F. Forsham, M.A., LL.D., of Bradford, England, *in absentia* and honorarily, in violation of the rules of the association, was adopted.

Dr. Truman offered an amendment to the rule regarding the conferring of the degree of Doctor of Dental Surgery honorarily, absolutely prohibiting the exercise of that privilege to the members of the association; but the amendment was lost, after discussion, it being the general sense that the present rule is a sufficient safeguard against the unworthy bestowal of the honor.

Dr. Cravens offered the following amendment to the constitution, which goes over under the rules:

Amend Article VII. so that it shall read as follows:

ART. VII. Any reputable dental college, located in any State of the United States, may be represented in this body upon submitting to the executive committee satisfactory credentials, signing the constitution, conforming to the rules and regulations of this body, and paying such assessments as may be made.

The association adopted a protest against the classification of dentists as manufacturers, as provided in House Bill No. 7696, known as the Willcox bill, and against the collection of statistics from dentists under its provisions, on the grounds that dentists are not manufacturers in any sense, not being engaged in the manufacture, fabrication, or sale of any product having a merchandisable value ; that all the laws heretofore passed in the various States and Territories and the District of Columbia distinctly recognize dentists as professional men ; and that the attempt to collect statistics would be an injustice not only to them but to their patients, and that such statistics if collected would be valueless to the government because showing the products of a class of men not engaged in manufactures.

The following, offered by Dr. Winder, was also adopted :

Resolved, That the National Association of Dental Faculties recommends that their alumni write and demand of the Census Bureau of the United States the return of all statistical reports, as, under the recent agreement between the dental profession and said Bureau, lawyers, physicians, and dentists are exempted from making statistical reports for the census of 1890 ; and that a copy of this resolution be forwarded to the chief of the Census Bureau.

A communication from the Post-Graduate Dental Association of the United States, suggesting the establishment by the colleges of short courses of training and teaching especially designed and arranged for practitioners, was received and referred to the executive committee.

The manuscript of a Compend of Materia Medica and Pharmacy for Dental Students, by Dr. E. L. Clifford, of Chicago, was referred to the committee on text-books, with power to act.

Dr. Marshall offered the following resolution, which was adopted :

Resolved, That the secretary be instructed to notify the National Association of Dental Examiners that the National Association of Dental Faculties considers it out of its province to legislate upon the relative values of the L.D.S. and D.D.S. degrees.

The following were elected officers for the ensuing year : J. D. Patterson, Kansas City, president ; H. A. Smith, Cincinnati, vice-president ; J. E. Cravens, Indianapolis, secretary ; H. A. Smith, Cincinnati, treasurer ; F. Abbott of New York, J. Taft of Cincinnati, and A. O. Hunt of Iowa City, executive committee ; James Truman of Philadelphia, Frank Abbott of New York, and Thomas Fillebrown of Boston, *ad interim* committee.

The president appointed as the committee on schools Drs. J. A. Follett, Boston ; S. H. Guilford, Philadelphia ; E. D. Swain, Chicago ; C. N. Peirce, Philadelphia ; T. W. Brophy, Chicago.

Adjourned to meet at the call of the executive committee.

NATIONAL ASSOCIATION OF DENTAL EXAMINERS.

THE eleventh annual meeting of the National Association of Dental Examiners was held at Niagara Falls, commencing Monday, August 1, 1892.

The sessions were presided over by the vice-president, Dr. Magill, the elected president, Dr. L. D. Shepard, of Boston, explaining his resignation from the State Board of Massachusetts, which necessarily carried with it his resignation of the presidency of the association. The resignation was accepted with regret, and Dr. Shepard was unanimously accorded the privileges of the floor.

The following State boards were represented at the sessions :

Colorado.—George J. Hartung.
Georgia.—D. D. Atkinson.
Iowa.—J. T. Abbott, J. B. Monfort.
Indiana.—S. T. Kirk.
Maryland.—T. S. Waters.
Minnesota.—L. W. Lyon.
Massachusetts.—E. V. McLeod.
New Jersey.—Fred. A. Levy.
Ohio.—Grant Mollyneaux, Grant Mitchell.
Pennsylvania.—W. E. Magill, Louis Jack, J. A. Libbey.
Tennessee.—J. Y. Crawford.
Wisconsin.—Edgar Palmer.
Kansas.—A. H. Thompson.

The following boards were admitted to membership :

Virginia.—J. Hall Moore.
North Carolina.—V. E. Turner.
Oklahoma.—D. A. Peoples.
South Dakota.—C. W. Sturtevant.
District of Columbia.—Williams Donnally.

At the instance of the committee on colleges, the following communication was sent to the National Association of Dental Faculties :

NIAGARA FALLS, Aug. 1, 1892.

To the National Association of Dental Faculties :

GENTLEMEN,—Whereas, a very considerable abuse has arisen by the improper use by students of the various certificates of the schools, such as the "standing" and "passing" certificates, to support students and graduates under age in their attempt to illegally engage in practice ; we therefore ask your association to request the various colleges to have their "standing" and "passing" certificates of such uniformity of terms in each case that they can be used for no other purpose, and that they be printed in few words and small type, and be signed only by the dean.

Respectfully,
NATIONAL ASSOCIATION OF DENTAL EXAMINERS,
FRED. A. LEVY, *Secretary.*

A committee of conference was appointed, consisting of Drs. Truman, Marshall, and Swain, on the part of the Faculties Association, and Donnally, Palmer, and Monfort, on the part of the Examiners Association, which after consultation agreed upon a favorable report.

Dr. Lyon offered the resignation of the Minnesota board, which was laid upon the table, as it had evidently been offered as the result of a misunderstanding, and the board was requested to withdraw it.

The following resolution, offered by Dr. Crawford, was adopted :

Resolved, That when a member of any State board becomes a teacher of a dental school, his resignation from his board should follow.

A resolution protesting against the classification of dentists as manufacturers and the collection of census statistics from them under the provisions of House Bill No. 7696, commonly known as the Willcox bill, was adopted. The resolution was similar in terms to those adopted by other dental societies.

The committee on colleges reported that they had received reports showing that the actual number of students in attendance at the last sessions in the schools recognized by the Examiners Association was 2881; of graduates, 1357. In the schools not recognized by the association the students were 236; graduates, 96.

The report also considered desirable advances to be made in educational methods, and offered the following memorial, which the secretary was directed to transmit to the National Association of Dental Faculties:

> The National Association of Dental Examiners would respectfully memorialize the National Association of Dental Faculties to authorize two advances in the system of dental education.
>
> These are: First, that your association require the universal enforcement of a higher grade of preliminary education of candidates for matriculation. This proposition lies at the foundation of dental education, in which is involved the quality of the graduates of the future, upon which depend the advancement, the standing, and the dignity of the dental profession.
>
> The second proposition is that complete preparation be made in each school for laboratory technique in the studies of histology, pathology, and in each of the departments of dental surgery and dental prosthesis, and that this method of teaching be made a requirement of the schools.

The committee also reported the following amended list of colleges which they recommend as reputable:

Baltimore College of Dental Surgery, Baltimore, Md.
Boston Dental College, Boston, Mass.
Chicago College of Dental Surgery, Chicago, Ill.
College of Dentistry, Department of Medicine, University of Minnesota, Minneapolis, Minn.
Dental Department, Columbian University, Washington, D. C.
Dental Department, National University, Washington, D. C.
Northwestern University Dental School.
Formerly Dental Department of Northwestern University [University Dental College].
Dental Department of Southern Medical College, Atlanta, Ga.
Dental Department of University of Tennessee, Nashville, Tenn.
Harvard University, Dental Department, Cambridge, Mass.
Indiana Dental College, Indianapolis, Ind.
Kansas City Dental College, Kansas City, Mo.
Louisville College of Dentistry, Louisville, Ky.
Missouri Dental College, St. Louis, Mo.
New York College of Dentistry, New York City.
Northwestern College of Dental Surgery, Chicago, Ill.
Ohio College of Dental Surgery, Cincinnati, O.
Pennsylvania College of Dental Surgery, Philadelphia, Pa.
Philadelphia Dental College, Philadelphia, Pa.
School of Dentistry of Meharry Medical Department of Central Tennessee College, Nashville, Tenn.
University of California, Dental Department, San Francisco, Cal.
University of Iowa, Dental Department, Iowa City, Ia.
University of Maryland, Dental Department, Baltimore, Md.
University of Michigan, Dental Department, Ann Arbor, Mich.
University of Pennsylvania, Dental Department, Philadelphia, Pa.
Vanderbilt University, Dental Department, Nashville, Tenn.
Western Dental College, Kansas City, Mo.
Minnesota Hospital College, Dental Department, Minneapolis, Minn. (defunct).
St. Paul Medical College, Dental Department, St. Paul, Minn. (defunct).
American College of Dental Surgery, Chicago, Ill.

The report was adopted.

The following officers were elected for the ensuing year: W. E. Magill, Erie, Pa., president; J. Y. Crawford, Nashville, Tenn., vice-president; Fred. A. Levy, Orange, N. J., secretary and treasurer.

Adjourned.

DENTAL SOCIETY OF THE STATE OF NEW YORK.

(Continued from page 568.)

DR. EDWIN T. DARBY, of Philadelphia, read a paper entitled "Dental Erosion and the Gouty Diathesis: Are they Usually Associated?" which was printed in full in the DENTAL COSMOS for August, page 629.

Discussion.

Dr. W. C. Barrett. I have not had the privilege of reading the paper in advance. I have given the subject some thought, and yet I have no positive knowledge on it. There are some things which I think I know, some concerning which I have a well-formed impression, and others about which I am all at sea; and I must say that dental erosion belongs to the latter class. I do not know what causes it. I have seen so many displays of that which we call dental erosion which were so contradictory, that I cannot form any clear idea of its etiology. It is claimed that it is sometimes due to gouty diathesis, as Dr. Darby mentioned. It has been asserted, too, that it is sometimes due to certain sexual troubles. That perhaps might be considered a cause for it, were it not for the fact that it is confined to neither sex; so that does away with that theory. It has been attributed to a great many different things. One gentleman attributes it to the use of salt. That is the broadest cause I have ever heard brought forward, because there is no one who does not use salt.

There is one thing that is positive: the immediate cause of it must be external. If it were constitutional (I mean the immediate, not the predisposing cause), there would be some functional disorder which would cause the resorption of the material which makes up the tooth. That is not the case. It is a solution from external causes. Sometimes it takes upon itself very singular forms. It is as distinct from that which we call abrasion as it can be. It is not due to abrasion upon the tooth-surfaces. Sometimes you find it upon the surface of molars; you have seen them cupped out. If you have not looked into it carefully, you will suppose that it is done by the occluding molar above or below; but you will notice, if you examine it, that it cannot be so. It must be from something else. In some cases there are distinct grooves, not transversely, but between the teeth. Between two teeth where by no possibility could a tooth-brush have reached, you find a distinct depression that has been caused by solution of the tooth-substance itself. It could not have been done by the use of floss silk. It is not only upon the mesial but upon the distal surfaces of the teeth. I have in my collection a Cœnopithecus in which there is as distinct abrasion of the teeth as I ever saw in any human being. I have not the slightest idea that that tailless monkey used tooth-powder or any kind of a tooth-brush. It must, then, come from some external immediate cause. Can it be the use of acids in the mouth? I do not think so, because in many cases the patient is not addicted to the use of acids. I cannot conceive that a lemon would produce the peculiar characteristics that we notice. If it were due to such causes,—to lemon or "Acid Phosphate,"—then the tooth would be eroded all over the surface. It would not be in a small, clearly marked place. Consequently it cannot be due to anything of that kind. It must be a solution from external causes. I cannot conceive that it should be anything else than a degenerated condition of some of the fluids of the mouth. I have no kind of faith in these litmus-paper tests for acids. I do not think it gives any idea of the pathological condition that exists. Many times the acids which are the most potent for the production of pathological conditions are those which are formed in the mouth, and the elements are there united; and at the moment of their union you get the most violent effects. I do not think, therefore, it is from any acid that comes from the outside. It must be some degeneration of the mucous glands of the mouth. I can conceive of nothing else to which it can be due. It cannot be due to a degenerated condition of the saliva, because there are too many instances where that would be impossible. It is in the immediate neighborhood of the gingival glands, and their secretion is different from the others. The gingival secretions are exceedingly acid, and the glands often become degenerated. I believe that such a disturbance will produce that which we call erosion of the teeth. I would criticise one assertion that was made, where the essayist said he believed it to be due to an advanced stage of civilization. I cannot agree with him in that, because we find it in the lower animals. I believe it is true that we usually do not find it in the laboring classes.

And now a word concerning its connection with the gouty diathesis: I have two or three patients at present; one man is a physician, and I have been fighting it and trying to do what I could with him for some time. He is subject to the gouty diathesis, and he thinks he sees a difference in the progress of this disease, when, during certain periods of his life, he has had an exaggerated condition of his gouty trouble. We know that the gouty diathesis is an acid diathesis, and it would seem to be connected with the solution of portions of the teeth; but I cannot quite accept the belief, at the present time, that it can be due to a single factor. I think there must be others. It does not seem as though the gouty diathesis alone could account for this. It may account for it as well in the case of the Cœnopithecus of which I made mention, as in the human being, because you have seen dogs and other animals which suffered from rheumatic diathesis, and also from gouty diathesis. I have seen dogs with joints just as distended from uric-acid troubles as human beings. I think the gouty dyscrasia is an important factor. It may undoubtedly produce a degenerated change of certain of the follicles of the mouth, and the secretions of these follicles may be so changed and disturbed that they themselves may act as dissolvers of the tooth-substance.

I am glad to have heard the paper. I never learn anything from the man behind me; it is the man before, with whom I can measure swords, from whom I obtain benefit. I am heartily, sincerely glad that there is something in the paper that I can antagonize.

Dr. E. A. Bogue. I want to state that although I have a large number of casts of cases of erosion, they all, as far as I can remember now, are cases taken from ladies' teeth, and all are taken from the class of society that does not have to live on a shilling a day and earn it. The hypothesis presented of the difficulty possibly arising from gouty diathesis has very much to recommend it, and has set me thinking; but I should like to ask Dr. Darby why we frequently find only two or four teeth affected? I have a recent case in mind—

within three weeks—in which the lower part of the two central incisors only are eroded, while the rest of the teeth farther toward the gum are not at all affected.

Dr. S. B. Palmer, of Syracuse. I cannot see why erosion should occur in the case just mentioned, other than the difference in the calcification of the tooth.

Dr. F. D. Nellis. I think I found the immediate cause in a case which I had. The patient, a lady about thirty years of age, had been in the habit of biting her nails ; this habit she had kept up for probably ten years. I have had her as a patient for four or five years. Three years ago the erosion was scarcely observable, but since then it has increased very much indeed, so that the right central superior incisor has been dissolved away on the palatine surface very much. I think perhaps that might be in support of the essayist's theory that changes in the buccal mucous glands might have something to do with it. The tongue is applied to the palatine surface of the upper teeth, and it is applied diligently perhaps for an hour at a time, when the person was thoughtlessly gnawing her nails. I also note the case of another person where the erosion or dissolution of the enamel on the palatine surface was not so great, although it will be so in time. The tooth in this case is very similar to the ones I have noticed in the mouths of clergymen. Clergymen are given to long and constant speaking. I have noticed in their mouths that erosion appeared in two-thirds of the cases I have examined.

Dr. Edward C. Kirk, of Philadelphia. I take it that we are to discuss not the question of the etiology of the erosion of the teeth, but the question of the relation of the erosion to the gouty diathesis. I think we have come to a point where we must all admit that what is truly known as dental erosion (the cases from which we can exclude the factor of abrasion) is due, as Dr. Barrett has expressed, to some external cause, and I believe Dr. Barrett, in his process of exclusion, got down as far as locating this acid secretion. At that point he showed why he could not accept the exact localization of it, because he has no faith in the litmus test. In 1886 I presented before the First District Dental Society of New York the results of some tests with litmus paper, and I laid down specific rules for making the test. I believe that when it is carried out in the manner which I indicated, it does have a positive diagnostic value. If in testing the oral mucus with a moistened strip of blue litmus paper it becomes red, you simply know that there is acid in the mouth. You would get the same effect if you dipped it into lemon-juice. But the test which I think locates the acid secretion is made by washing off with water the labial mucous membrane, and protecting the teeth with a napkin, then laying the moistened litmus on the napkin and pressing the lip over the moistened paper, and holding it there for a full minute. You will, in erosion cases, have a most interesting result. You will find that the surface of the litmus is not reddened as a whole, but a series of dots or points of red appear on the blue ground, and as the acid penetrates the litmus paper by absorption you will find these spots will coalesce, and you will get a representation, in the first stage, of the mouths of the glands which are pouring out the acid mucus, and later a graphic reproduction simulating the eroded areas on the teeth. If we have the acid localized, and there is an eroded spot in the tooth in juxtaposition, it seems to me that we have nearly all the circumstantial evidence we need to determine the relation of cause and effect. I have been a champion of this acid-mucus theory for a long time, and consequently I have been asked to explain the way the acid secretion could produce erosions or abrasions under all sorts of conditions. Having made this much of the demonstration, I do not think it is incumbent upon me to do so, as the *onus probandi* rests at present upon the opponents of the theory. I think you can demonstrate in any case, using the test described, just where the glands are located that secrete the acid mucus which is causing erosion of the teeth.

An interesting point was raised by some gentleman as to why certain teeth would be eroded and others not. You will find two incisors on one side of the mouth affected, while all the other teeth are free from erosion. Erosion of the teeth is a progressive condition, and if you will follow the case up you will find the disease goes on until other teeth are involved. It does not stop. Erosion will continue unless there is some fundamental change in the constitutional condition. All these cases have a beginning, and the beginning, so far as the teeth are concerned, is marked by the limitation of the process to one or two teeth.

I want to call attention here to one point regarding the hypothesis presented in the paper, of the relation of the gouty diathesis and erosion. I believe there is a most intimate relation, but we should have a somewhat clearer understanding of just what is included in the gouty diathesis. I have never seen cases where dental erosion was well under way but what there was a distinctly acid condition. You will find all the teeth in such cases free from tartar. I never saw a case of advanced erosion where tartar was on the teeth. The surface of the tongue is usually dry, there is a thickening of the mucous secretions, and frequently the tongue is fissured-looking, much as it is in attacks of fever.

Dr. W. Jarvie. Do you mean tartar in any part of the mouth?

Dr. Kirk. Yes; I have found the mouth extremely free from tartar in those cases. The appearance of the mucous membrane, where erosion has gone on rapidly, is, I believe, characteristic. We have grouped under the term gouty diathesis the condition ordinarily known as gout, in which there are calcific deposits in the joints, etc. We have also the condition known as rheumatoid arthritis, in which condition there is a fibro-plastic deposit. The erosion seems to me to be more acute and progresses more rapidly in cases of rheumatoid arthritis than in a typical case of gout. This acid condition of the fluids of the body presents a nervous phase. The slightest irritation will produce not an inflammatory but a neuralgic effect. The three conditions are intimately associated, and in different temperaments are manifested as gout, rheumatoid arthritis, or gouty neuralgia, respectively. I have no doubt of their intimate relation. I believe that the recognition of these nutritive disturbances, with respect to this dental lesion, is something we should take into account at once. It is evident that mere mechanical stopping by filling is almost futile. It does not save the teeth. The disease goes on, and we must look to the constitutional treatment of the patient if we wish to arrest it.

I announced in the discussion of Dr. Kells's paper before the First District Dental Society, in October of last year, that it was my habit to ask the patient if he ever had gout or if he had a gouty history, and, with two or three exceptions, I have found the gouty tendency to exist. I am on record there for stating that dental erosion pure and simple,—not abrasion from mastication or the use of brushes, but real dental erosion from the action of the buccal mucus,—is a symptom of gout. I believe it is a manifestation of gout that precedes any of the general disturbances, except, possibly, dyspepsia. I have had, not so far as the dental erosion is concerned but the acid condition of the mucus, most satisfactory results from using a combination of salicylic acid with phosphate of soda, used internally as a regular medicine three times a day. It is put up in the form of granular effervescent salts. I believe that if we do not cure the disorder, we can at least prevent it from increasing by recourse to the means which I have outlined.

Dr. Barrett. Dr. Kirk, in speaking of the deposits in the joints, etc., says the deposits are calcific. What does he mean by that?

Dr. Kirk. I mean the "chalk-stones of gout," as they are usually known,—the urates of lime and soda. I used the term in contradistinction to the fibro-plastic deposits in cases of rheumatoid arthritis.

Dr. S. G. Perry. Perhaps I can best illustrate my views in this matter by tearing a leaf out of my personal diary. I discovered, one summer, a peculiar sensation on one of the incisors in my mouth, not noticeable when I looked in the glass, but easily felt with the tongue. About the same time I was very much annoyed by an eczematous condition which manifested itself upon my fingers, between the toes of the right foot, on which I stand most, and somewhat on the toes of the left foot, on which I stand least. Some little time afterward I was nearly killed, as I thought, by an acute attack of gout, the memory of which is enough to make me hope I shall never have such another experience. The pain was something beyond description. Consultation with physicians at that time brought out the fact that I had the uric-acid tendency, and that I should give attention to food and diet. The eczematous condition came to be a matter of concern. I could not escape the conviction that the cause was due to some fault in the assimilative process. I commenced experimenting. I gave up meat. I lived mainly on milk for quite some time. The eczematous condition disappeared, and has never returned. Naturally you will see that I was set to thinking about this condition of the front surfaces of my teeth. Asking questions of several medical friends of mine, the fact was brought out that the eczematous condition was due to an excess of uric acid in the blood. The fact was also brought out that certain foods were conducive to the uric-acid condition. Spending last summer in Carlsbad with Dr. Darby still more fully confirmed the idea that this acid condition in general was the cause of not only the abrasion that commenced on the front surfaces of the teeth, but the terrible pain and stiffness of the joints from which I had suffered.

I will relate one or two cases which will illustrate the idea: A very bright, intelligent, self-reliant woman came to me with these eroded conditions appearing on her front teeth, which were very beautiful. I told her I thought it was due to gouty diathesis, aggravated by her food, too much champagne, and not sufficient out-door exercise, marking out the proper dietary and hygienic treatment. She acted upon it at once, and in a few months the glossy, polished condition of the surfaces of her front teeth commenced to deaden a little, and to-day, which is perhaps a year and a half after the commencement of this treatment, the condition of erosion has entirely disappeared in her mouth, and the surfaces, which had become polished and bright, are to-day dull in appearance and in feeling, like the other teeth. I hardly know how to describe the appearance and the feeling. They are almost as though they were cartilaginous, as though the mineral portions had gone. There is no acid action present. This lady had marked gouty symptoms. I assure you that she is a convert to the idea that the gouty diathesis begins in the way which I have outlined.

A well-known lawyer of New York came to me, after about a year's absence, and I said to him, "You are suffering from a marked case of uric acid in the blood." He said, "How do you know?" I answered I could tell from his teeth. He informed me that I was correct, and his physician was very fearful of his condition. Deep grooves had occurred in his teeth in the year's time that I had not seen him. The most marked case of abrasion, however, that I ever saw was in the mouth of a patient who is now dead, having dropped dead in a street car. He was a great sufferer from gout, which allowed him to be about, and did not confine him to his bed, although he suffered terribly at times. The teeth were cut and whittled away, inside and out, and on all the surfaces.

Dr. Jarvie. What little I know on this subject is mostly of a negative character. The mouths of four patients occur to me at this moment,—one of a lady about forty years of age. I had not seen her for several years, and she was much distressed at the wasting away of the superior incisors which had taken place since I had last seen her. I took models of her mouth. I should mention that the two centrals were pulpless; both teeth had been opened from the palatine surface, and the nerve-canals treated and filled, and at this time the gold protruded beyond the surface of the teeth. Some two years afterward the teeth had wasted still further. I took the models, and about four years later I saw her again. I believe the third set of models show a considerable wasting away, the great bulk being at the margins. The wasting had extended to the cuspids at the last time I saw her. That lady is dead. I cannot say whether there was any gouty tendency in her case. If there was, I did not know it.

One of our brightest lawyers, a very intelligent man, was much concerned about the wasting away of his incisor teeth, particularly on the labial surfaces of the superior incisors, the entire surface being wasted in irregular lines. The inferior incisors were cut quite deeply by a narrow groove. In his case (I know him intimately) I am not aware of the least gouty tendency. The gentleman is small and active, very light, and a man, as far as I know, in almost perfect health, as capable of work as almost any one I know. He is fifty five years of age.

In another case, a man of thirty, a great, big fellow, the labial surfaces of his upper and lower teeth were almost entirely denuded of enamel. He is in perfect health, and has never had occasion to call in the services of a physician for himself since he was a boy. I do not know that there is the least gouty tendency in his case.

I tested all three of these cases, some two months ago, with litmus paper, following the directions given some years ago by Dr. Kirk, having these people come to me before breakfast. I washed the lips, dampened the litmus paper, and folded it in position over the napkin. I found a slightly acid reaction,—not very acid, but still decidedly so. This subject, as presented by Dr. Darby, is certainly one of great interest, and it may open the way to a solution of the cause of erosion. It seems to me it is a matter that can be quite easily proved. There are towns where large numbers of gouty people congregate for treatment. It seems to me that it would not be a difficult matter to open communication with physicians who are treating large numbers of these cases, and have the mouths of such patients examined. It may be incident to the gouty diathesis, or it may be caused by the gouty diathesis. I have determined that it is almost always caused by an acid condition of the mouth. We cannot get that smooth condition by any other action. The acid is corrosive, and when it acts upon the dentine you have left the organic matter which is not carried away. Dr. Black has produced an apparently similar condition in teeth out of the mouth by the action of a current of hydrochloric acid; but the current had to be kept up at the rate of thirty feet a minute to produce this effect. With the teeth left quietly in the acid, there was no effect. We cannot get any such current in the mouth. We cannot get more than one foot a minute. Teeth left in a solution of 1 to 1500 in one month were not affected. To get any such effect upon the teeth by acids, we must have rather a powerful acid in the mouth. If one part of hydrochloric acid to forty thousand of water will color litmus paper very decidedly, such acid as is in the mouth would not affect the teeth in the least. And how do we get a polished surface on the teeth?

Dr. Kirk. Dr. Jarvie has brought out two or three very interesting points, and he has recalled to my mind that I failed to refer to one point that I promised in my previous remarks. I want to emphasize the fact that the tooth, as well as the exact spot on it which is eroded, is determined by the position of the follicles secreting the acid. They may be at the gum margin or in the labial mucous membrane.

With regard to the very slight degree of acidity that is found in these cases, Dr. Jarvie is doubtful, because hydrochloric acid, applied under artificial conditions, has failed to produce a condition similar to erosion, except with a current of so many feet per minute, etc. That is interesting as far as it goes; but it is not reasonable to suppose that hydrochloric acid is the acid which produces dental erosion. There are acids and there are acids; and though a number of them are very strong, yet they would have no such effect upon the tooth-structure as we find in erosion, while weaker acids probably would. I doubt if litmus paper would show the effect of lactic acid in carious teeth, and yet caries goes on largely through its agency.

In regard to the polished surface: Take a piece of chalk and a dense piece of marble, which are chemically the same thing, but in different states of molecular aggregation. If they are subjected to the action of hydrochloric acid, the effect will be different. The marble will show a polished, vitreous surface, whereas with the chalk the acid will penetrate it and make it porous. It is the relative density of the tooth-structure that is being operated on that makes the difference in the manifestation. You only find the polished surface in teeth that are very dense. If the teeth are sometimes dull, as Dr. Darby has said, you will find the tooth-structure loosely calcified. The acid mucus secretion is not alone responsible for the total result; it no doubt has a number of other factors, and the brush is probably one of them, in so far as it helps to remove the *débris* which is the gelatinous matrix resulting from the decalcification.

Dr. R. Ottolengui. I want to touch on two points only, and the first one is corroboration, in a beautiful way, of something Dr. Darby has said. He made the statement that dead teeth do suffer from erosion, because he had seen it. There is a cuspid, a hole in which was filled by Dr. John Hawes, and in those days he filled the entire root-canal with gold, so that the gold filling extends into the root-chamber. Since then erosion has begun, and rapidly reached the gold filling. Through the labial surface of the bicuspid can be seen plainly a long strip of gold filling. I wanted to refer to a point at the time Dr. Kells read his paper before the First District Society, but could not do so. Dr. Kells combated the idea that erosion occurred on the masticating surfaces of molars and bicuspids, a position which is not in contact with the mucous membrane, and where it would seem difficult for the mucus to get. Dr. Darby advanced the theory that it is a mistake to suppose that this cup-shaped cavity can be caused by abrasion. As soon as you bring two opposing jaws together, you will see that they do not fit. You would think from that that Dr. Barrett is right, but I believe he is wrong. An erosion has never been seen in the masticating surface of a tooth, and I want to call your attention to what we see there, and to account for the cup-shaped depressions, in spite of the fact that the teeth do not fit together.

In all typical cases of erosion there is no destruction of the enamel of the teeth, except exactly at the point where the erosion is. That is a very marked point in this disease,—that it attacks a single spot, and leaves the rest of the enamel perfect. Do you ever see a denuded portion of dentine where the original point is intact? No. You find the teeth have been worn away until they are square. This erosion wears the teeth away to a flat approximation. Two teeth rubbing together cannot possibly make these concavities. The explanation is, that the abrasion is not of the two teeth against each other, but they grind food between them, and it is this food which, being constantly soft and made more and more soft, accommodates itself. As soon as the enamel has been worn away, the further mastication of food will wear out the dentine more rapidly than the enamel, and consequently you get your cup-shaped cavities, which you do not get simply by abrasion of two teeth together. Dr. Barrett has referred to the fact that the lower animals exhibit erosion. The lower animals more frequently exhibit these cup-shaped cavities than erosion. They are worn away by mastication. I have seen the most perfect specimen known of a mastodon, which has teeth much like those of human beings, but much larger. In the crown of that tooth you have an exact reproduction of that which I call abrasion, and which some people call erosion. The dentine is good, while the enamel is worn across. The appearance of this condition in the molars must be excluded from the nomenclature of erosion, and cannot be used as an argument.

Dr. L. Ashley Faught, of Philadelphia. I have for some time been actively interested in this subject. When Dr. Perry made the assertion that we should examine for uric acid, he touched upon the line of subject that I was at work upon. We should look to the cause, and where we find this uric-acid condition the analysis of the urine would often throw light upon it. I have been engaged in that study—not directly from the standpoint of erosion, but in relation to the production of uric acid—for some time. There is one thing I have been waiting to hear expressed, and that is, that you will find in the majority of cases, where you have the condition of erosion, what is known as a bilious temperament.

Dr. R. H. Hofheinz. This discussion has revealed to me a very interesting feature, namely: that I am a typical case of what Dr. Perry and Dr. Darby have spoken about. About six months ago I detected an eroded condition on a superior bicuspid in my mouth, and being in doubt as to the etiology of the condition, I treated it with simple remedies. About three months ago I began to be troubled with this same difficulty that Dr. Perry has mentioned, and I think that this, in addition to what has been said, ought to be sufficient. I am of a gouty ancestry. My father and brother both had it very badly.

Dr. Gibson, of New York. Dr. Perry has requested me to make a statement in regard to my own case. I am a victim of gout, and have been for twenty-five years. I have found that, not only through an examination of the urine but also of the blood. The erosion which has taken place in my teeth is a guide to me in treatment. Whenever the eroded teeth become sensitive to the nail of my finger, I place myself under treatment. My physicians tell me that an examination of the blood has been of more assistance to them in my case than the examination of the urine.

Dr. Darby. I only wish to correct a misapprehension. I infer from some of the remarks that have been made upon the paper, that you did not wholly understand me in regard to the character of the secretions. I did not intend to infer that secretions of the mouth were not acid, or that this was not the result of an acid condition of mucous glands of the lip. That is just what I wish you to understand, but that the character of the secretion was changed by the gouty diathesis. In a normal state, the product of the mucous glands of the lip is alkaline. If you were to make a test of litmus paper, you would find that it would show an alkaline reaction; but I wanted you to understand that the gouty diathesis is the predisposing factor of the change which occurs in the character of the secretion.

(To be continued.)

TWENTY-THIRD ANNIVERSARY MEETING OF THE FIRST DISTRICT DENTAL SOCIETY OF THE STATE OF NEW YORK.

(Continued from page 304.)

DR. D. R. STUBBLEFIELD, Nashville, Tenn., read a paper entitled "Pus-Formation, Revived."*

Discussion.

Dr. James Truman, Philadelphia. It is always difficult to follow a writer of a paper and do justice to his position, but doubly so when the essayist acknowledges at the outset that he does not claim originality, but is merely giving a *résumé* of the more recent observations on a difficult subject. The one chosen for the instruction of this body is one that for nearly a century has claimed the serious attention of the best histologists and thinkers in the medical ranks, and hence any effort to dispose of it in a single essay, or in any replies which may be made, will certainly fail of being wholly satisfactory.

The author of the paper does not, however, regard it as an old matter, for he speaks of "a new subject being difficult to retain, . . . and it requires an especial effort of attention and mental concentration to grasp it."

The essayist takes for his text a personal communication in which the writer says, "It is believed that all bacteriologists claim that pus, wherever found, contains bacteria, and that the bacteria are intimately associated in causing that pus," and then quotes the experiment of injecting a "poisonous acid, and thereby developing a suppurating wound." "The same acid, hermetically sealed in a thin glass shell, is put into an incision and healed in. After perfect union the shell is crushed, liberating the acid, and no suppuration is developed. This is due to the exclusion of bacteria. This seems to advocate the theory that bacteria do not float in the blood, and so reach an internal wound."

The correspondent then illustrates by a tooth struck in a fall, and it is surmised the pulp is dead. A drill-hole is made, and the pulp found alive. Pus is formed in a "locality which has been well protected from the external approach of bacteria. If they have entered through the circulation, why is it that the point most distant from their entrance-way, the foramen, is suppurating, and not the part which is around and about the foramen itself?"

The essayist then proceeds to ask the main question, "Is it possible that bacteria do not cause suppuration?" and in doing so takes up the correspondent's queries *seriatim*, and proceeds to answer them.

Before doing this an attempt is made to correct a general impression, as he regards it, "that bacteria, and the cause of pus, micrococci, are the same." This is regarded as a mistake, they not being "interchangeable terms."

Exactly where the writer gets his authority for this, I am not able to discover. It has been generally recognized by bacteriologists, as far as I am at present aware, that the term bacteria, or schizomycetes, covers the entire class, or, in other words, it is a generic word. I quote from Miller. According to de Bary, the chief forms of bacteria are: 1, cocci; 2, rod forms; 3, screw forms.

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* See page 692, current number.

To the first group (coccus forms) belong:

a. Micrococci.
b. Macrococci.
c. Diplococci.

To the second group (rod forms) belong:

d. Bacilli.
e. Clostridium.
f. Leptothrix, etc.

It is not necessary to follow through the entire classification, and it is also recognized that there are some variations from this, but the fact remains that the word bacteria still is used in a generic sense.

Having devoted more than half of the paper to a very able answer to the supposed fallacies of his correspondent, the subject is taken up and more generally considered. The ideas at present held in regard to inflammation are briefly discussed. To this altogether too condensed a statement there can be no serious objection made. It is general, and, following the rule of all general statements, unsatisfactory.

After describing the diapedesis of the leucocytes, the essayist says, "A diversity of opinion exists as to which of the normal cells are most active in the formation of new tissue, but the safest view seems to be the one that holds that all the cells undergo proliferation when stimulated, and all combine to develop the embryonic tissue as a common product."

The "products of the inflammatory process" may be "organized into permanent tissue, or, failing in this, may perish."

Farther on it is stated, "All authorities agree that septic infection must come from without the organization." . . . "The dry spores floating with the air will be easily taken care of by the living, unbroken tissues, for inherent in them we find that mysterious power of nature tending always to the maintenance of health. Every injury, however, causing a wound destroys the vitality of those cells that lie in the direct path of the agent producing the lesion."

The essayist then follows to build up the theory that "these injured cells, combined with the blood and lymph that is poured out, constitute an area of dead but not decomposed albuminoid substances. This type of organic matter furnishes the richest and most welcome pabulum for the rapid development of the myriad micro-organisms." . . . "The existence of micro-organisms . . . is marked by a rapid development of an exceedingly diffusible and poisonous product called *ptomaines*." . . . "The last stage of textural destruction is the final liquefaction of the tissues and infiltrating leucocytes, aided by the oxidation of large quantities of lymph serum. . . . This is the formation of abscess, or a cavity filled with lymph serum, myriads of dead white blood-corpuscles and . . . shreds of necrosed tissues; in a word, *pus*."

In regard to inflammation being produced independent of micro-organisms, the writer holds this view: "Mechanical irritation by foreign substances seems to be a myth, unless attended by the introduction of micro-organisms. There may be pain, . . . but as a *rule* this will not cause suppuration."

I have endeavored to give a brief recapitulation of the views of the writer of the paper. It would be impossible to do him justice without a restatement of the entire essay.

It will be seen that the main idea sought to be established is that micro-organisms, "*as a rule,*" cause suppuration. The writer confines his quotations to narrow limits, but makes many broad assertions, doubtless founded on his own observations and those of others.

The subject of inflammation is one not easily dismissed in a few pages. The phenomena attending this have been the constant study of many men. When Hunter proved by experiments that the heat in the focus of inflammation was not as great as that at the center of life,—the heart,—a great step was made forward. When Döllinger (1819) observed the emigration of the colorless corpuscles, there was a still further advance made toward a solution of this difficult problem; and when these were pronounced by Kaltenbrunner (1826), and Williams, Addison, and finally Waller, in 1846, to be identical with pus-corpuscles, there seemed to be a solution of the problem for that period.

A long interval followed from the time when Waller so thoroughly completed his work to that when Cohnheim, in 1867, electrified the medical world with his announcement of the diapedesis of the white corpuscles through the capillaries and veins, and this as the origin of pus. The period was long enough for the scientific world to have forgotten the whole matter, and Cohnheim's discovery was regarded as a new chapter in science. That it was original there can be no question. The old was, however, fastened to the new, and the Waller-Cohnheim theory of the emigration of the leucocytes of the blood has been considered as the principal, if not the sole, origin of pus. This, however, has not been accepted without opposition. The discovery had scarcely been announced before it was met by a determined feeling that would not let the older theory of Virchow die a natural death. Von Recklinghausen, who did so much to demonstrate the amœbic character of the white blood-corpuscles, entered the list of opponents. Stricker, with energy, combated it, and the number grew who contended that while the views of Cohnheim were correct as far as they went, it could not be conceded that emigration was the sole origin of pus. It was regarded as impossible that this process could account for the innumerable pus-corpuscles witnessed in every abscess. This was only explainable on the older theory that irritation resulted in a retrograde to protoplasmic life, and that this metamorphosis resulted in the formation of masses of cells—pus.

This was the status of this question up to the period of the theory that suppuration was caused by micro-organisms.

We are now prepared, with this brief *résumé* of the subject, to consider the main question as propounded by the essayist. Do micro-organisms produce pus?

It is not with the intention to antagonize this, the prevailing conclusion, that I enter upon the consideration of this subject. It must be admitted that the evidence is too strong, and the position too deeply intrenched in facts, to make the task of combating it an easy one. There is still much to be accounted for before the statement, in its broadest sense, can be accepted.

It will be observed that our essayist is careful to state "that, as a rule," micro-organisms produce suppuration. If it be *a rule*, there should be no exceptions, or when any occur it should be explainable on the fixed hypothesis. When the correspondent illustrated his position by the tooth affected with a blow and suppuration resulting in a closed cavity, he stated a fact that admits of but one explanation, and that must be that the micro-organisms of suppuration have access to the pulp through the circulation; yet the essayist claims "that they do not float in the blood, except when the organism is already the seat of septic infection." This leaves but one source for infection from without: either by contact with septic matter, or through air infection. The former needs no argument to substantiate it, but some of the best bacteriologists utterly repudiate the latter as a source of infection. Miller says ("Micro-Organisms of the Human Mouth"), "An attempt has been made to ascribe this very unpleasant result (pericementitis) to an infection of the pulp occasioned by germs from the air. . . . This idea deserves to be ranked among the many other wonderful theories of olden times." He then follows this with the number of micro-organisms in a given quantity of air, and further concludes, "The chances would then be that in one hundred thousand operations of this kind, the success of one would be endangered by the entrance of one germ into the pulp-cavity. Whether this one germ . . . could produce any disturbance would depend upon the existing circumstances."

As the suppurating pulp may not be considered a satisfactory illustration, let me refer to another case. At the Fifth Surgical Congress, Paris, April 3, 1891, M. Peyrot reported the case of a man upon whom he had operated December 4, 1890, for abscess of the liver. The abscess was a very large one, and was opened by simple incision. When the drainage-tube was being placed in position, a considerable quantity of pus escaped into the peritoneal cavity. The patient nevertheless made a good recovery without the slightest untoward symptom. The explanation of this fact was given by the bacteriological examination of the pus. Cultivation on various nutritive media was unsuccessful. Septic poisoning did not follow its injection into the peritoneal cavity of guinea-pigs.

The sterility of pus from abscess of the liver has been shown many times by Kartoulis and Laveran. This fact explains the absence of accidents to surgeons in tropical climates who open hepatic abscesses without taking the least antiseptic precautions. (*La Tribune Médicale*, April 16, 1891.)

If the assertion of Steinhaus, that ptomaines are "capable of producing suppuration without the presence of living organisms," be accepted, pus-formation without their immediate presence, as in the case cited, may be explanatory of the phenomena presented. Janowski demonstrated that "turpentine produced an aseptic suppuration in dogs, and, on the other hand, dead cultures of *micrococcus prodigiosus* also produced suppuration, showing that the living organism is not always required." (Laplace, *An. Med. Sci.*)

H. S. Stark (*Med. Record*, New York), a recent writer on the subject of "Traumatic Infectious Diseases," says, "It is still questionable whether, in the production of pus, we have invariably an infection with some pyogenic micro-organism. On this point very capable authorities are at variance. G. Lemaire has recently succeeded in producing local suppuration in various animals by injecting subcutaneously small quantities of aseptic metallic mercury. The pus in these cases was carefully investigated, and was shown both by microscopical examination and by culture experiments to be free from germs. In the opinion of the author, the suppuration was due to the chemical action of a mercurial compound formed by the reaction of some organic liquids upon the metal.'' (*An. Med. Sci.*)

''Janowski, of Warsaw, has observed that creolin is one of the few substances capable of producing *suppuration by itself, and without the least intervention of micro-organisms;* the drug excites purulent secretion devoid of micro-organisms. From experiments made in different animals it was found that creolin produced suppuration in about three days after the injections.'' (*Ibid.*)

This statement becomes of practical importance, as creolin has come into extended use in the treatment of pulp-canals, from its supposed powerful antiseptic properties.

Miller, on the subject of chemical irritants, says, ''Careful investigations made by Klemperer, Biondi, Zuckermann, and many others, have led to the conclusion that 'chemical irritants, when free from micro-organisms, cannot produce suppuration.' Kreibohm and Rosenbach, Grawitz and de Bary obtained other results. According to them certain chemical substances, as oil of turpentine, ammonia, nitrate of silver, etc., may under favorable circumstances call forth suppuration. Scheuerlen was also able to cause suppuration by the action of an alkaloid of putrefaction (cadaverine) without the agency of micro-organisms. Nathan repeated the experiments of Grawitz and de Bary, and also found that suppuration took place after injections of oil of turpentine, ammonia, and nitrate of silver. In all cases, however, he was able, by means of the culture method, to establish the presence of micro-organisms. Nevertheless Grawitz, in a subsequent communication, maintains the correctness of his previous conclusions.''

Miller, in summing up these somewhat conflicting statements, says, ''As the matter stands at present, the burden of proof seems to be in favor of the view that, in case of dogs at least, certain substances may, under specified conditions, produce suppuration without the agency of micro-organisms.'' The same author, in the work quoted (page 293), says, ''As regards the etiology of alveolar abscess, we have adopted the universally accepted view that it is caused by bacteria. There can hardly be a doubt of this, particularly as the most careful investigations have proved that suppuration can arise without micro-organisms only in exceptional cases.''

In regard to the possibility of infection through the blood, H. S. Stark, before quoted, says, ''The other variety of sepsis . . . is not caused by the germs of putrefaction or their products, but rather by certain micro-organisms which, entering the circulation from without, retain in the blood the power of reproduction and multiplication.''

Charrin and Roger have made some experiments on the action of blood serum of diseased animals upon pathogenic microbes. Their method of procedure, in all cases, was to draw the blood from the carotids into sterilized flasks, and to draw off the serum after the blood had stood for forty-eight hours on the ice. They then inoculated healthy serum and the serum from diseased animals with small amounts of a pure culture of the bacillus of blue pus.

"In the first instance there was an abundant growth of bacilli, in the second instance the growth was scanty, and, moreover, the bacilli had lost entirely, or in a marked degree, the properties of coloring the media in which they were grown." (Ernst and Jackson, *An. Med. Sci.*)

Prudden, speaking of the germicidal action of blood serum, says, "The very occurrence of self-limited diseases, such as typhoid fever, acute lobar pneumonia, etc., strongly suggests, if it does not prove, the existence in the body of some sort of bacteria-destroying agency." Nuttall claims that "observations lead directly to the conjecture that there is some agent in the fluid constituents of the blood which destroys the germ." (*Ibid.*)

It must be clearly evident from the quotations made that there is a wide margin for an antagonistic opinion, at least, to the idea entertained that suppuration is always caused by micro-organisms. If the conclusions of Miller be accepted, that infection from the air be almost impossible, and the same result is doubtful through the circulation, the subject remains very much where it was left by the earlier investigators.

If micro-organisms are essential to the production of pus, they must be present at the point of all irritations, for the moment the vessels are subject to disturbance a change takes place, contraction and expansion, increased circulation, and finally stasis, with aggregation of the leucocytes along the walls, and finally their emigration and recognition as the true type of the pus-corpuscle.

It cannot be denied but that at a later stage micro-organisms become a powerful factor in the destruction of tissue, and possibly may have a potent influence in those structural changes which result in metamorphosis, and possibly to the increased multiplication of pus-cells.

The fact must be recognized that the leucocytes act as destroyers of micro-organisms in the blood, and given a constitution of full vitality, germs find it difficult to exist in the circulation. Hence it is assumed that that source for infection is practically closed.

The deep interest which attaches to this question must be the excuse for this extended reply. To us as dentists it is important that the doubts at present surrounding it should be removed. We are brought face to face daily with pathological cases, and in so far as our knowledge reaches certainty will success be attained.

Professor Carl Heitzmann. The essayist certainly tried his best to give us lucid information upon the source and the formation of pus. The question is, Has he succeeded? In order to be able to answer such delicate questions, two properties are essential: first, to be a thorough bacteriologist; and second, to be a thorough pathologist. Does he claim to be a thorough bacteriologist? I doubt it. From what he read to us, there are points which, to a man sufficiently acquainted with bacteriology, seem to be somewhat curious. The gentleman militates against the term "bacteria," which somebody who is not mentioned brought before him when writing him a letter. It was good that he did not mention the name, because the gentleman did not know much about it. Anyhow, does the essayist know, or does he not know, that there are pyogenic bacteria in the line of little rods, and bacilli in the line of cocci or dots? We have learned through a number of researches that the bacillus in tuberculosis produces pus. There is one called bacillus fœtidus, another the bacillus pyogenes, which cause suppuration. There are bacilli indeed which do such mischief.

It is useless to deny that certain bacilli and cocci, especially the group of staphylococci, cause suppuration. Are these really the only causes? Here, gentlemen, I have brought a bunch of pamphlets, written by our late friend, Dr. William H. Atkinson. He gave me about one hundred copies of his last publication for distribution. In this article we have, I dare say, a very lucid exposition of the formation of pus, both bacteriologically and pathologically. Strange to say, the essayist, who has quoted this paper, has not read or studied it. All the questions that Dr. Truman raised are answered in Atkinson's paper. They are not mentioned by the essayist at all.

The point of the whole question is exactly what Dr. Truman has stated. We stand to-day on the same ground as we did ten years ago, since we do not know whether every suppuration is caused by the presence of micro-organisms. Another reason that makes me suspect that Professor Stubblefield will not claim to be a bacteriologist is this: he speaks of spores of bacteria. There are some observers who have seen little dots in the middle of some cocci, called spores; but we must not speak of them. The cocci themselves are just visible at the power of 1000, in the shape of minute dots. To speak of spores of the cocci is rather strange.

The second question is, Does the essayist claim to be a pathologist? I do not know; but from what he said I may be permitted to doubt it. He gives us a brief *résumé* of the present standing of the question, which was ably discussed by Professor Truman. Up to this time there has been a vast number of observers who have claimed that emigration of leucocytes is the essential feature, not only in inflammation, but also in suppuration, and that we have full right to call pus-corpuscles leucocytes.

Last October 13th we celebrated the seventieth birthday of a great man in Berlin,—Professor Rudolf Virchow,—who was, some fifty years ago, the first to positively announce the doctrine that in inflammation the blood-vessels and the blood serum have nothing essential to do; that it is the cells, as they are called, which drink the exudate, and grow and proliferate and divide, and by their division produce innumerable bodies, which were called pus-corpuscles. For twenty five years he had to look at the hands of Cohnheim, who said that the whole inflammation is nothing but an emigration of leucocytes; but at his seventieth birthday, after last year's international congress in Berlin, he wrote a short but splendid article, just to show that he was right fifty years ago, and that the whole theory of Cohnheim fell to nothing.

In the last twenty years something happened which Professor Truman will find worth while mentioning: that not only the so-called cells are proliferating, but also the basis-substance between the cells, a doctrine which I may mention was established by myself in 1873, and fully accepted in 1880 by Professor S. Stricker, my old teacher in Vienna. He is the one great authority in Europe who is entirely with me. He told me at my visit to Vienna two years ago, that he was disappointed at the lack of acknowledgment he received. I replied that that should just encourage us to work all the more, to our last breath. He said, "I have given it up ; there is no use." I retorted, "I am fighting it as hard as I can, to prove I am right." I am still working successfully in my laboratory, and all who have studied with me must be convinced that my doctrine is correct.

Twelve years ago Boedecker made the assertion that in the dentine not only the dentinal fibers are alive, but the whole of the basis-substance, and the assertion was based upon the observation that the basis-substance was pierced by a delicate reticulum of living matter. This topic was taken up by Dr. William Carr, in my laboratory, some five or six years ago, and when we used the treatment with chloride of gold we could prove the presence of the reticulum. Dr. Carr did not follow the work, however, and left it to me and to Dr. John I. Hart to prove the presence of this reticulum, the features of which are so characteristic that at the first glance through the microscope we can tell which is a live and which is a dead tooth. Think of what that means, you dentists who every day produce inflammation in the dentine by putting in fillings ! Quite recently a specimen was shown to me by Dr. Boedecker, in which an amalgam filling has plainly brought forth the reticulum. Why do you fill carious teeth so often with perishable materials? Soft teeth, for instance, if treated with metallic gold, will not stand the filling, and, from what I understand, they often prove a failure. Why do you introduce such agencies as oxyphosphate of zinc? Because you want a reaction, and you will find that after a few months where you had soft dentine you have firm, consolidated dentine, upon which you can work with more safety. This reaction was shown to me by Dr. Boedecker in a tooth filled for many months with oxyphosphate of zinc. The tooth had been filled with amalgam on one side and oxyphosphate of zinc on the other, and on both sides it was beautiful. I leave it to you to judge what is inflammation and what suppuration. It is plain enough that, what I point out with especial care and urge, the living matter increases in the cells as well as in the basis-substance, and is then broken up, first into inflammatory and afterward into pus-corpuscles.

When you come to compare what I have said with all that is in Atkinson's paper, and with what the essayist has stated, you will understand that where there is an abscess there is a loss of tissue. There is nothing dead about it, since the pus-corpuscles creep about the same as amœbæ or colorless blood-corpuscles do. The tissue broken up to pus is not dead ; it is merely disintegrated and reduced to its embryonal condition. If the gentleman wants to read my definition of pus-corpuscles, this view ought to be taken, and since Cohnheim's theory has fallen to the ground, you may be satisfied with it.

In conclusion, suppose, as the case of the essayist has been, a man falls upon the pavement, strikes a tooth ; the outcome is death of the pulp, and eventually an abscess. Suppose a young man, blooming in health, goes skating on the ice ; he suddenly falls without injuring himself, but coming home gets a chill, and after a few days has an inflammation, not in the skin, not in the muscles, but in the femur,—and not in the bone itself, but in the middle of the bone, the medulla, which is the dread disease called osteomyelitis, and in a vast majority of cases leads to death.

Those who know something about bacteriology, and claim that there is no abscess possible without bacteria, cannot explain the fact that those organs reach the center of the femur. There is but one way to answer, just as was done by Professor Stubblefield: that there must be micro-organisms floating at times in our blood. We may have a little felon, a little suppuration of some kind, which may be instrumental in transferring the staphylococci into the blood, and a slight injury may suffice to cause a severe suppuration in the medulla of the femur, a suppurative osteomyelitis.

One of the discussing gentlemen said that under such conditions pyogenic micro-organisms may, at least temporarily, be present in the blood. Then comes the point settled by excellent observers, that if you inject pyogenic micro-organisms directly under the skin, there will not be suppuration, but first there must be inflammation, brought forth by the injection of a chemical agent or a traumatism. Under such conditions you are sure to get the suppuration after injecting pyogenic organisms.

Dr. George S. Allan. Dr. Truman has said very much of the material that I had marked in this paper to criticise. The paper starts out, as you will notice, to be an elementary treatise, as it were, on the subject of pus-formation. We are about in the position of being a lot of scholars, and Professor Stubblefield is the teacher. He takes as his text some quotations from a letter written by a gentleman with whom we are not acquainted, in reference to the subject. The supposition is that Professor Stubblefield was called upon to write this paper because he was posted thoroughly on the subject, and this paper shows a great deal of thought, a great deal of care in its composition; but, I am sorry to say, not so thorough a knowledge of bacteria and the formation of pus.

Dr. Truman drew attention to the mixing up, I might say, of his ideas and classifications in drawing a sharp line of distinction between bacteria and micrococci, bacteria being the generic name of a large number of micro-organisms, of which the others are simply species. Again, Dr. Stubblefield alludes in his paper to the spores of micrococci. As a matter of fact, we do not know definitely that all micrococci proliferate by the formation of spores. There have been observations made which point to the fact that some micrococci proliferate by spores; but that all the micrococci proliferate in that way I cannot say positively. Therefore his allusion to the spores being carried through the blood, and in that way the germs carried to a part that is inflamed, and leading, as it were, to suppuration, is open to question. I believe that the formation of pus is due to some four micrococci, and one or two bacilli, possibly. Professor Heitzmann alluded to one form which produces pus. There may be half a dozen specific forms which produce pus; whether there are more, we cannot say at present. In referring to the experiments by Councilman and Sternberg, I think the essayist is a little misleading. The experiments they made were of a two-fold character. They injected foreign substances under the skin, taking the greatest care in order to prevent any septic trouble. Where they injected croton oil they may have had suppuration; but where they injected powdered glass and Prussian blue, and other mechanical irritants, they did not have suppuration. It did not follow the inflammation. In referring to the matter further, he draws the conclusion, and I think he is right, that the burden of proof lies in the fact that you cannot, as a rule, have suppuration without the presence of micro-organisms.

Councilman states explicitly that you cannot have suppuration if the Lister method is followed out in its fullness; but you cannot always prevent the introduction of bacteria. One point which has not been alluded to by the essayist, it seems to me, would be well to state here. It is undoubtedly a fact that you can have inflammation and pus-formation without the introduction of micro-organisms, but the number of cases where that is possible is limited. It is not at all liable to continue unless organisms in some way or other obtain access to the abscess or the pocket. The distinction between an irritant like corrosive sublimate or croton oil and micro-organisms is this: the latter is a continuing irritant. It is not thrown into the system in a given quantity, and allowed to be absorbed, but the growth of the micro-organisms continues to produce the irritant that causes the formation of pus. If it were not for the ptomaine that is the result of the growth of the germs, we would not have pus,—at least not as a result of the introduction of micro-organisms.

That modern surgery is based on the exclusion of these germs is an admitted fact by all. A few years ago no surgeon would have thought of opening the abdominal cavity; but now it is a common procedure, and surgeons all over the country do it, and operate on the organs contained therein, and this they do solely through their ability to exclude germs.

I had hoped that Professor Stubblefield would give us something practical from a dental standpoint. The lesson we should draw, as dentists, is to make all our operations where the soft tissues are exposed, where the pulp or mucous membrane of the mouth is exposed, so carefully, and under such aseptic conditions, that we will not permit of the intrusion of micro-organisms. This question that was asked as to the pulp in the coronal end of the tooth containing blood can be explained only on the supposition that the germs in some way or other had been carried through the system and through the foramen of the tooth, and then through the pulp up to the coronal end, and the only reason they proliferate there is that because there we have some tissue for them to feed upon. Some micro-organisms live upon dead matter, and they find it not at the foramen, but at the coronal end of the pulp, dead or semi-devitalized, and there they proliferate.

Dentists do not have a chance to use many of the aseptic precautions of surgery; but there is one preparation that they can use a great deal more freely than they do, and that is bichloride of mercury. It is a mistaken idea that bichloride of mercury is going to injure your instruments, or be troublesome in any way. It is a germicide pure and simple, and not an antiseptic, and one of the most powerful germicides that we have. Used in the proportion of 1 to 1000, it is invaluable. If you will use, instead of distilled water, rose-water, you can dip your instruments into it with impunity. You can pass your mouth-mirror into a Bunsen burner, and then dip it into the solution and wipe it off, and you can keep the mouth and your instruments perfectly clean and in an aseptic condition. But whether you use this or any other, the lesson that Dr. Stubblefield teaches us is absolute cleanliness in all our operations. Everything we put into the mouth must be kept clean and in an aseptic condition.

[Professor Charles Mayr, of Springfield, Mass., who was expected to take part in the discussion, was unable to be present, and sent the following contribution, which was read by Dr. Ottolengui :]

The introduction is remarkably clear and concise ; in fact, I read it with great pleasure, and from its clearness I would certainly say that the author does not belong to those who can neither teach nor don't offer a fine soil for new discoveries. It seems to me, however, that he slightly exaggerates the little experiment with the acid in a sealed glass bulb. We agree with him in his conclusions, but these experiments are so far from being objectionable that I was slightly astonished that so much attention should have been given them.

In speaking of the bacteria floating in the blood, there must be a difference as to quantity. We all know that the human system is capable of enduring the presence of small quantities of any infectious bacteria ; up to a certain amount the system is able to take care of them ; only if they reach a certain maximum, different in every individual, the zymotic effects are produced. During a cholera epidemic, while only two per cent. of the population may die, or only four per cent. show the disease in a degree that appears in returns, certainly ninety per cent. are infected, showing more or less symptoms; but their bodies conquer the intruder. With pus a similar state may exist : constantly spores reach the lungs ; often we receive small wounds, suppurating; a small number may be absorbed, floating around ready to infect any wound, the vitality around which is lessened.

In regard to the inflammation, might it not be possible that the symptoms are made purposely in this manner by the nerves ; that the first instantaneous contraction of the vessels is an effort to exclude outside intruders ; that the dilatation, by gorging the tissues and stopping the circulation, serves in a secondary manner the same purpose ?

I do not take the view that this is a kind of mechanical disturbance not desired by the body. My opinion is that it is planned, purposed, and regulated by the body for those precise purposes. For thousands and thousands of years all tissues have been subjected to attacks of microbes. They have learned how to handle them, just as the complex government of our foot in walking over obstacles ; the fine connection between the foot and the eye is acquired by long experience. In exactly the same manner has the reaction of the body in case of wounds called inflammation been acquired and regulated.

Even gangrene is a nervous process put up rapidly as a last ditch against invasion. The older and weaker the tissues, the sooner they are driven to this last ditch. In cases of gangrene in the young, death is not necessarily involved, as the noma occurring in children shows. No grown person could withstand such a putrefaction. On the other hand, the danger of gangrene in older persons is very great, because, while the tissues may be able to throw up the barrier of gangrene, they may not be able to mark a new line of fortification beyond the barren territory. I would be inclined to compare gangrene to a retreat of an army, with the destruction of everything through the line of retreat, so as to prevent the enemy from progressing through the devastated territory.

It is also not improbable that some of the microbes of gangrene are hostile to those of putrefaction, and that the system attempts as a last resource to pit one microscopic foe against another, even at the risk of seeing the second more powerful than the first.

The system is also fighting for a delay, knowing that the microbes of infection have only a certain period to live. The system knows that all much better than the most excellent "microbist" existing; while the latter may have given a few years to the study, the system has been studying them perhaps for millions of years; and it was not a book study, it was a series of savage experiments in which millions were slain.

The whole paper of the author has to be welcomed as a very valuable elucidation of the subject of "Formation of Pus," but I think he underrates vastly the species and varieties of microbes, the species active in destructive processes.

Take even such a well-known animal as the horse; a Shetland pony is certainly a horse; it can enter by doors through which another horse, say a Percheron, can hardly peep in. I doubt whether our classification of microbes has gone as far yet as would be, as an example, with mammals,—the distinction between a horse and a cow, not to speak of distinguishing varieties. It may be that diseases to which we give specific names are caused by a genus, and that the different forms of such a disease are due to the different species of that genus of microbes, the changes in the symptoms being due to varieties of those species,—and so on *ad infinitum*.

AMERICAN DENTAL ASSOCIATION.

The thirty-second annual meeting of the American Dental Association was held in the Park Theater, Niagara Falls, N. Y., commencing Tuesday, August 2, 1892. The attendance was somewhat beyond the average in point of numbers, and most of the papers read were important, though not defining any marked departure from accepted beliefs and practice.

FIRST DAY—*Morning Session*.

The association was called to order by the president, Dr. W. W. Walker, of New York, at 11.15 A.M.

After the dispatch of the usual routine business, the president read the annual address, in which, after congratulating the members on the high rank attained by American dentistry, to which the members of this association have so largely contributed, he stated the principal reason for the existence of the association to be that by its influence professional skill and studious development may be promoted.

Referring to the projected World's Columbian Dental Congress, the address stated the object to be "to contribute notably to the elevation of the profession, to stimulate the spirit of research, to strengthen fraternal courtesy, and promote cordial co-operation throughout the world among all who desire the advancement of dental science and art. The aim would be too limited if it included less than this, and the enterprise will be a failure if it falls short of a realization of this ambition.'' This first opportunity in the history of American dentistry to show to the world what has been accomplished by American dentists in the past half-century makes it incumbent upon every one to put forth his best efforts for its success. It is estimated that about thirty thousand dollars will be required in advance of the congress, from which the magnitude of the work to be done by the twenty-three committees, under the executive committee, may be inferred. It is expected that there will be no laggards, but that all reputable members of the profession, realizing the personal nature of the obligation, will become identified with it, and contribute promptly and liberally.

Under the topic of ''Dental Education, Legislation, and the Dental Degree,'' the president considered the variations in the state laws regulating the practice of dentistry, and the occasional clashing between the dental colleges and the state boards of examiners. It would seem that where a student has pursued the prescribed courses in a reputable dental college, and has successfully passed its examinations, his diploma should entitle him to practice in any state without further examination. To provide a remedy for the existing state of affairs, whereby the boards in many states examine graduates, he suggested that the candidates for graduation should be examined by the respective examining boards of the states in which the colleges are located at the same time that the faculty examinations occur, those who pass both bodies satisfactorily to receive the usual diploma, to be countersigned by the proper officers of the state examining board, which document should be a passport to practice in any of the states.

The president also thought that all the states should be divided into districts, each possibly with its corresponding district society, and each district society should have its board of examiners; each district to be represented in the state board by one examiner from the district organization recommended to the state society by the district; all state boards so constituted to be elected by the dentists in the state, and never to be appointed by the governor. If the need should arise for a national board of examiners to act as a final court of appeal, it could easily be created under the scheme here proposed.

Taking up the idea of furthering the practical work of the association, the president indorsed the suggestion of the DENTAL COSMOS that each section be made the repository of the results accomplished throughout the Union in its given department. The annual report would thus truly represent the progress of dentistry during the previous year. Briefly, the suggestion is that a few questions, carefully chosen as to importance and suggestiveness, be formulated by this body, and that every state and local organization be requested to take up one or more of these as a regular order of business at each stated meeting, an accurate report of the discussion to be forwarded to the secretary of the American Dental Association, to be by him transmitted to the chairman of the proper section, who shall collate the data so secured, and make a careful digest of the same as the basis of his report at the annual meeting. Organizations furnishing reports should send their quota of delegates to represent them in this body when the matter comes up for discussion. This plan is not intended to do away with the present work of the sections in securing valuable original essays and the results of scientific research, but is suggested as an additional means of increasing the usefulness and strength of the association, by securing, first, a more intimate relation and community of interest between the American Dental Association on the one hand, and the state and local organizations on the other; second, the co-operative organization of the entire working force of the dental profession in America; third, the necessary material for the active development of the section work of the association, placing the sections upon a firm basis, so that each will become a sub-organization engaged in special work under the government of the general body, which will then become a truly representative federation of active societies of specialists. Its work will thus be in harmony with the dignity of a national body, and members in attendance can devote their time and attention to the lines along which they have the greatest interest.

To carry out these purposes a standing committee is recommended, to be known as the Committee on State and Local Organizations, to have full charge of all matters which properly fall within its jurisdiction as before indicated. A modification of the plan proposed had been carried out in the Dental Society of the State of New York at its late meeting, with gratifying results.

In conclusion, the president suggested, in view of the expectation that all reputable dentists of the United States will attend the World's Columbian Dental Congress, that the meeting of the association in 1893 be simply for business purposes, the election of officers for 1894, and action upon the report of the special committee to which was referred the amendment of the constitution and by-laws.

The address was referred to a committee, consisting of Drs. E. C. Kirk, L. D. Shepard, and J. N. Crouse, which reported at a subsequent session, recommending an appropriation of five hundred dollars from the funds of the association to the treasury of the World's Columbian Dental Congress. With reference to the unification of state laws regulating the practice of dentistry, while desirable, it could not be hoped for unless the profession was willing to level downward rather than upward. What can be hoped and expected is the strengthening of the society for each state, so that each board will be of such knowledge and efficiency that its certificate of examination will be respected by the boards of other states, and either take the place of or modify the obligatory examination. In most states the scope and thoroughness of an examination is entirely within the control of its board, the only obligation being that the board shall be satisfied that the candidate possesses the requisite knowledge and skill.

With reference to the appointment of state boards, the members are state officers, their power is derived from the state, and their appointment must be from the state, either directly through the executive or by some delegation of powers. If the state society embraces in its membership even ninety or eighty per cent. of the reputable dentists, would it not be feasible to get the consensus of their views as to the proper appointee and by any suitable method recommend him to the executive? Would not an intelligent governor welcome such assistance, and generally be glad to be thus relieved of the responsibility? Would not a political governor, realizing the political power back of such a petition, consider such an appeal paramount to any similar effort or petition coming from other sources? In this view the objection to lodging the appointing power with the governor, on the ground that he would not know the most competent men or would be swayed by political motives, ceases to have the magnitude so often affirmed, and the plan affords a less complex system of securing a competent board than the one suggested. Matters should be so managed in each state by a spirit of conciliation and devotion to the furtherance of a uniformly higher education, that the state society should practically embrace the entire reputable profession of the state. This would also be the principal factor in securing the best laws and their proper enforcement, the most competent board, and the much-desired inter-state comity and general recognition of state licenses.

The committee, fully coinciding with the view of the president as to the benefit to be derived from the organization of the working forces of the profession, offered the following resolution:

Resolved, That a standing committee, to be styled the Committee on State and Local Organizations, and composed of three members, shall be appointed, originally for terms of one, two, and three years respectively, and that all vacancies due to expiration of term shall thereafter be filled for terms of three years. All vacancies occurring for any other cause shall be filled for the unexpired term. The basis of the plan and scope of work of said committee, and its duties in relation thereto, shall be the suggestions as set forth in the address of the president of the American Dental Association for the year 1892, also the articles from which he quotes, and in harmony with the circular letters issued by the chairman of the executive committee.

The committee also recommended a resolution that the meeting for 1893 be convened at the time suggested, Tuesday, August 15, 1893, and that the report of the special committee on amendments to the constitution be laid over for consideration at that meeting.

The report and the resolutions embodied were adopted.

The president appointed the Committee on State and Local Organizations as follows: Edward C. Kirk, Philadelphia, chairman; J. N. Crouse, Chicago; and Louis Jack, Philadelphia.

The committee subsequently reported the following set of questions, which they recommended for discussion among the state and local societies during the coming year, in accordance with the plan before described:

No. 1. Should examining boards have power to grant certificates of qualification to undergraduates?

No. 2. Should immediate root-filling be practiced while purulent conditions exist at the apex?

No. 3. What are the best materials to enter into the composition of temporary fillings, to be retained for a minimum of three years?

No. 4. What are the best methods for obtunding sensibility of the dentine by either local or general means? Should arsenic ever be used?

No. 5. What are the best forms of partial lower dentures and the methods for constructing the same?

No. 6. Corrective dentistry: its present status; what are the simplest and most universally applicable forms of apparatus and most efficient retaining fixtures?

No. 7. To what extent and under what conditions is the collar crown a cause of pericemental inflammation?

No. 8. In cases of congested pulp, should the arsenical application be made without preliminary treatment?

No. 9. What are the advantages and disadvantages of the use of the matrix (*a*) with gold, (*b*) with plastics?

No. 10. The etiology of pus-formation.

The election of officers was held Friday, August 5, 1892, and resulted as follows: J. D. Patterson, Kansas City, president; J. Y. Crawford, Nashville, Tenn., first vice-president; S. C. G. Watkins, Mont Clair, N. J., second vice-president; Fred A. Levy, Orange, N. J., corresponding secretary; George H. Cushing, Chicago, recording secretary; A. H. Fuller, St. Louis, treasurer; W. W. Walker and S. G. Perry, New York, and D. N. McQuillen, Philadelphia, members of the executive committee.

A report of the papers and discussions will appear in subsequent issues of the DENTAL COSMOS.

SOUTHERN DENTAL ASSOCIATION.

THE twenty-fourth annual meeting of the Southern Dental Association was held at Lookout Mountain, Tennessee, commencing Tuesday, July 26, 1892. The sessions were held in the pavilion of Lookout Inn, and were largely attended. A number of interesting papers were read and discussed. The special social features of the gathering were a ball on Wednesday evening, which was graced by the presence of the leading society people of Chattanooga and vicinity, and a banquet on Thursday evening, tendered by the Tennessee State Dental Association, each of which was highly successful.

FIRST DAY—*Morning Session.*

The association was called to order by President Gordon White, of Nashville, Tenn., at 11.35 o'clock A.M.

The secretary, Dr. H. C. Herring, being temporarily absent through illness, Dr. L. P. Dotterer, of Charleston, S. C., was appointed secretary *pro tem.*

Dr. J. Y. Crawford, Nashville, Tenn., then presented the president with a handsomely ornamented gavel, as a token of esteem from some of his friends. It was made, he said, from the wood of a historic tree grown on a historic spot, in graceful allusion to its carrying a memento of the battle fought just below the spot where the meeting was held. In accepting it, Dr. White said he should always prize it as one of his most valued treasures.

Mr. H. T. Olmsted, on behalf of the Chamber of Commerce of Chattanooga, welcomed the members in a witty and enjoyable speech, which was liberally punctuated with applause.

Dr. D. R. Stubblefield, president of the Tennessee State Dental Association, then delivered the formal address of welcome in behalf of the dentists of Tennessee, to which an eloquent reply was made by Dr. Geo. J. Friedrichs, of New Orleans.

The president, calling Vice-President W. H. Marshall to the chair, read the annual address, the first topic treated of in which was professional dignity. "Every profession," says a noted Frenchman, "has its scum." He was sorry to say that some who were reckoned good men placed themselves on a level with this scum by their methods of advertising. Sometimes it is an interview in the local paper; sometimes a description of an operation, or the wonderful inventions of our brother, or even the architecture and furnishings of his office. In one locality a college graduate asserts his skill in every known branch of the profession and guarantees his work; in another, "Mary had a Little Lamb" adapted to the requirements of a dental advertisement. Is such a course professional? Is it dignified? Does the profession approve it? Does it win public respect? One prominent man could not recall a single desirable patient attracted by twenty years' advertising. Are not the schools primarily to blame for these advertisements? One presumably reputable school advertises in the newspapers that dental graduates are recognized by the medical profession, and that its graduates step at once into a lucrative practice, making in ready money so many dollars a day. Another advertises for infirmary patients, and holds not even church pews too sacred for its hand-bills. Do such advertisements give the students a correct idea of the dignity of our profession? It has been said that the student is a mirror, in which are reflected the idiosyncrasies of his preceptor. Shall we say that a college graduate, with the certificate of the state examining board, who calls attention to his "New Dental Parlors" in flaming hand-bills, mirrors the college from which he came?

Are such practices by practitioners or colleges consistent with the code of ethics? The courts in England have recently held that a man who joins an honorable and registered society must strictly observe the rules of that society, sustaining the General Council of Medical Education and Registration in removing the name of a prominent dentist from the register for having advertised his business, contrary to the rules of that body. That decision forms a precedent for the courts of other countries. Is not the action of the council a worthy precedent for this association? The address also touched on other methods of advertising, as in placing business cards on envelopes, more especially when accompanied with a picture of the dentist or with a cut of an invention made by him, the publication of price-lists, etc.

Laws have been enacted in most of the states, and examining boards have been appointed to enforce them, with the object of protecting the public and the profession. While they may not accomplish all that is desired, they are a step toward a higher standard of requirements, and the boards should have the moral support of all dentists.

With regard to the project of a permanent home for the association, the president thought the idea of erecting a suitable building for the annual meetings at some desirable summer resort was admirable, but was it practicable? It would mean the outlay of a large sum of money without any return; and furthermore, men would not go to the same place year after year. If the association will have a home, by all means let it be located in some central city, and be so constructed that a part can be rented, yielding sufficient revenue to pay all expenses, with the advantage of being an object of interest to all dentists passing that way. His personal preference would, however, be a national home, and, as has been suggested, a national museum, located in Washington, or some central city, where from all parts of the country we can send our treasures, and thus found a monument to the dental profession of America.

The work of organizing the World's Columbian Dental Congress, first suggested at the meeting of this association in 1890, has so far progressed that the date for it has been fixed: from August 17 to August 27, 1893. So far as possible, all should attend this congress.

Passing to the consideration of the domestic concerns of the association, the president expressed his approval of the movement to hold the election at an early period of the meeting. He also suggested the creation of a committee on orthodontia, and the thorough revision of the constitution,—not to embody anything new, but to make plain that which was already there, though sometimes vague and indefinite in terms.

On motion of Dr. Barton, the address was referred to a committee of three, to report at the afternoon session. The following were appointed: Drs. E. S. Chisholm, M. C. Marshall, and H. A. Lowrance.

Dr. W. W. Walker, New York, chairman of the executive committee of the World's Columbian Dental Congress, was introduced, and made a brief statement of the work done in the organization of that gathering. Dr. Taft's committee on conference with state and local societies had so far pushed along its work that it was now in touch with every reputable dentist in the United States, and that in itself represented a vast amount of work. The finance committee, of which Dr. L. D. Shepard is chairman, is one of the most important in the scheme. Without money the congress would be a failure. We must have money to run it, and every reputable dentist should become a member, and go down deep into his pocket to help it along. Dr. Storey claims that the project was born in this association; New Jersey also claims its paternity. Be its parentage what it may, we are assured of its honorable birth, and we want all to work for it. One committee had not yet been appointed: that to look after the pleasure and comfort of the ladies. He thought Drs. Gordon White, Storey, and McKellops eligible candidates to this committee, whose selection would give universal satisfaction to the ladies, and those most interested.

Adjourned till 3 o'clock P.M.

Afternoon Session.

President White called the association to order at 3.12 P.M.

The amendment to the constitution offered last year, changing the time for the election of officers, was taken up on motion of Dr. V. E. Turner, chairman of the executive committee, who moved that the time be fixed for the afternoon session of the second day of the meeting, which, after discussion, was adopted.

Vice-President Marshall assumed the chair, and the committee on the president's address was called. Dr. E. S. Chisholm, Tuscaloosa, Ala., chairman, read the report, which indorsed the views of the president on dental ethics, and wished a stigma could be placed upon the evil of advertising. It also agreed with his ideas with regard to the other subjects mentioned, except with reference to the founding of a permanent home. In that regard the committee adhered to the original idea of a home for the Southern Dental Association.

The report was received, and the subject declared open for discussion.

Dr. B. H. Catching, Atlanta, thought the address bore rather hardly on the colleges. They were not nor could they properly be held responsible for the acts of their graduates after they passed out of the control of the schools. The unfavorable report on the president's views regarding the home question pleased him, as he believed the association should be permanently located in a home it could call its own, and he favored locating on Lookout Mountain.

Dr. Chisholm. The suggestion of a dental Chautauqua, as it has been called, admits of considerable thought as to whether it would be a benefit to the association to locate itself at all; whether more good will not be accomplished by continuing the plan of holding the meetings at different points. As a permanent location Lookout Mountain has many advantages, but before a final choice is made it would be proper to visit Monteagle, which also presents considerable claims. The railroads offer a round-trip ticket at an extremely low rate to any who may desire to investigate its advantages.

On motion of Dr. Crawford, the courtesies of the floor were extended to all visiting dentists, especially the members of the Tennessee State Dental Association.

Dr. R. R. Freeman, Nashville, thought the colleges and the profession are responsible for those who are to follow in our footsteps. Every one must shine out by his own light, and the responsibility is upon every man that his light be clear and not misleading. There are many, unfortunately, to whom success lies in one direction only, to whom the only important thing is the accumulation of dollars, and by these any fair means will be adopted to secure the end. It takes such men years to come down to Solomon's conclusion, "All is vanity and vexation of spirit." Success worth striving for comes only through seeking to benefit others. If one seeks at all times to give his fellow-practitioners a good example, he has no occasion for a code of ethics. Some of our best men look back with regret on their early days of practice, when they were after the dollars only. The way to convince a man that he is not doing his duty is to show him his error. The speaker had always tried to walk in legitimate lines, but when he looked back at some of his earlier cards he felt ashamed of them. He had pity for one who started out to do cheap work, because such a one doesn't know what he is doing. He thinks it is every fellow for himself. If you will let him know, convince him thoroughly, that advertising is not the best way, you will likely make a good man of him. Our president has never been brought much in contact with this class, and he would like to force them all up to his line. It is right to get them there, but it will have to be done slowly and kindly.

Dr. H. J. McKellops, St. Louis, was much pleased with the address. We want to get away from this stigma of advertising. It is the same in every city. Advertising dentists are to be seen everywhere, their advertisements sometimes showing in the newspapers, sometimes in the form of ridiculous signs. Sometimes a dentist goes to an association meeting, and when he comes home columns of the local paper are taken up with describing what he saw and did. Dentists ought to mingle more with the reputable men of their communities,—the merchants, lawyers, and doctors,—and thus raise up dentistry in the eyes of the public. How many dentists do take a prominent part in public affairs, and thus become known as public-spirited citizens? With regard to founding a home for the association, he did not quite approve of a permanent location. It would be a great expense, and in his judgment it would be better to go around as heretofore, and thus bring more men into membership, and do better service to the cause of dentistry. If located at one point, the members would soon get tired of coming, because it would be an old thing.

Dr. J. Y. Crawford, Nashville, hoped to be pardoned if he departed somewhat from the usual mode of discussion in speaking to the subject of advertising. Ethics is the rule of right,—of doing "unto others as ye would that others should do unto you." The grossest violations of the code of ethics, and those doing more harm than any others, are committed by ministers of the gospel in indorsing patent medicines. He believed that these patented nostrums were more hurtful than the use of rum. For himself, he would never again listen to a man in the sacred desk who lends his influence to the advancement of patent nostrums. So far as advertising dentists are concerned, he believed that in the aggregate no man ever was benefited by such advertisements as have been spoken of here to-day. It is well-directed, honest effort to alleviate suffering that wins recognition that is of lasting benefit. He considered it as wrong for the newspapers to advertise nostrums as for ministers to indorse them, and he hoped the time would soon come when neither the press nor the pulpit shall be used for the advancement of nefarious things.

One question brought up in the address, but not mentioned in the report of the committee, was the proposed formation of a committee on orthodontia. In the speaker's opinion, there was no other subject in the entire field of pediatrics so important as orthodontia. It addressed itself to almost every child on the American continent.

Dr. Francis Peabody, Louisville, Ky., was pleased with the address of the president, because it touched up a well-established irregularity. The speaker had made himself unpopular because he had taken the same stand with reference to advertising. No education will make a gentleman; it must be born in him. He had been laboring for years to do what he might against the advertising idea. In the olden times, before dentists were required to take a degree, there was less of it than to-day, because then we were not a profession, and not so much was required of us. The young dentist went out from the office of his preceptor with such information as he could gain there. To his mind, the better way to overthrow the advertising evil would be to educate the public to the fact that they did not and could not get proper value from the services of these men; that they were only after the dollars. The dental schools have done much to turn out quacks,—not because they have not tried to educate them in the proper way, but because they have received as students young men who ought never to have been received, not having the necessary moral and educational qualifications. The dental colleges are not alone in this shortcoming; it is the same way in the medical profession. The evil of advertising cannot be stopped by decrying the quack and trying to crush him. The only way is to make the public understand just what sort of treatment they will receive if they patronize that class of people.

The subject was passed.

(To be continued.)

The election of officers was held Wednesday, July 27, 1892, and resulted as follows: B. Holly Smith, Baltimore, president; R. K. Luckie, Holly Springs, Miss., first vice-president; S. B. Cooke, Chattanooga, second vice-president; L. P. Dotterer, Charleston, S. C., third vice-president; D. R. Stubblefield, Nashville, Tenn., corresponding secretary; S. W. Foster, Decatur, Ala., recording secretary; H. E. Beach, Clarksville, Tenn., treasurer; W. R. Clifton, Waco, Tex., and Gordon White, Nashville, Tenn., members of the executive committee.

Chicago was selected for the next place of meeting, and the date was left with the executive committee.

DENTAL SOCIETY ANNOUNCEMENTS.

SOUTH DAKOTA DENTAL SOCIETY AND BOARD OF EXAMINERS.

The annual meeting of the South Dakota State Dental Society will be held at Huron, S. D., on Tuesday, Wednesday, and Thursday, September 27 to 29, 1892. F. O. Sale, *Secretary*, Huron, S. D.

The South Dakota State Board of Dental Examiners will meet in regular session at the office of Dr. F. O. Sale, in Huron, on Tuesday, September 27, 1892, at one o'clock P.M. As hereafter certificates will be issued by the board only when in regular session, all persons desiring to commence the practice of dentistry in the state of South Dakota prior to the regular meeting next year are requested to meet them at the time and place stated above, prepared to have their diplomas passed upon, or to be examined as to their qualifications.

W. H. H. Brown, *Secretary*,
Yankton, S. D.

WEST VIRGINIA STATE DENTAL SOCIETY.

The first annual meeting of the West Virginia State Dental Society will be held at Wheeling, W. Va., on Wednesday, October 5, 1892. Members of the profession are cordially invited to be present.

Geo. I. Keener, *Secretary*, Morgantown, W. Va.

NEW JERSEY EXAMINATIONS.

The next meeting of the New Jersey State Board of Examiners will be held at the Commission Rooms, No. 88 Broad street, Elizabeth, N. J., commencing on Tuesday, October 18, 1892. Candidates will please file their applications with the secretary before October 4. Blanks and information furnished on application.

G. Carleton Brown, *Secretary*,
No. 88 Broad street, Elizabeth, N. J.

EDITORIAL.

A GENERAL SURVEY.

THE annual dental gatherings of the past month have developed certain features which, grouped together, are important in their relations to the dental professional work projected for the coming year. If these may be taken as showing the present temper of professional thought, they indicate pretty clearly the trend of the lines along which the greatest activity in dental professional work may be expected to proceed. We have detailed reports of the meetings of the American and Southern Associations, and the state societies of Pennsylvania, New Jersey, and Tennessee. In all of these there has been evinced a marked reaction on the part of the majority of the members against the tendency to discuss problems in ethics, legislation, education, and matters affecting dental polity, largely to the exclusion from these important meetings of a consideration of the more practical technical questions which directly bear upon dental practice. Similarly, the undue prominence, both as to time and place, which has been given to the consideration of topics involving abstract speculation and theorizing along scientific lines only remotely related to dentistry proper, has received its share of criticism from those who represent by far the largest proportion of the dental profession,—those who practice dentistry from the standpoint of the bread-winner.

These diversions have a common origin: the desire to elevate professional standards. It is, however, probably true of the members of the dental profession, as of the community at large, that they are more interested in what a man knows than in what he thinks. Communications, largely speculative in character, in which the author's imagination is the main source of supply for his facts, are becoming deservedly unpopular. More especially is this the case when the topic chosen has only a remote dental bearing. Subjects collateral to dentistry form a legitimate and necessary field for research; but they should not be allowed to encroach upon the study of distinctively dental matters to an extent which threatens the exclusion of the latter from our dental meetings.

There will always exist in the dental profession a modicum of those who are the exponents of the x, y, z end of scientific thought in its dental bearings, and who will claim that the only road to a high professional standing is in the line which they mark out. We believe, however, that it cannot be successfully gainsaid that professional growth toward a higher standard must be made upon purely dental lines, and that the recognition of that standard by the public will come because we are broadly cultivated as dentists, and not, primarily, because we are proficient in branches of learning outside of, though collateral to, dentistry. It would therefore seem desirable that while giving to advanced scientific thought the prominence to which its legitimate expression is fully entitled, a duly proportionate consideration should be accorded to the technical phase of dentistry, and so give to it the dignity with which a truly scientific treatment would invest it.

Moreover, the fact is not to be lightly ignored that so long as the great mass of the dental profession secure "food and raiment" solely by their dental work, the bulk of their time and energy is necessarily taken up with the problems of daily practice, leaving little or none with which to "consider the lilies of the field." The demand from these is, and will continue to be, for such ideas and methods as they can turn to useful account in their rôle of bread-winners.

Recognizing these facts, the American Dental Association, adopting a suggestion of its president in his annual address, has set on foot a scheme to secure a due proportion of material of the practical character referred to, and so increase the general interest in its meetings, and incidentally of dental meetings throughout the United States. It has appointed a committee to formulate each year a series of practical questions upon important matters in dentistry. These questions are to be sent to all local organizations in the United States, with the request that they be taken up for discussion in sequence at the stated meetings, a report of the discussions to be sent to the secretary of the American Dental Association. Each report, as received by the secretary, will be transmitted to the chairman of the section concerned, who will embody a digest of the matter so collected in his annual report. It can readily be seen that these collated reports, if carefully made, will be an invaluable contribution to dental literature, as embodying a reliable epitome of the views of the profession of the entire country upon the various subjects.

The list of queries formulated by the committee for the ensuing year will be found in the report of the American Dental Association at page 755 of the current issue of the DENTAL COSMOS. A full set of answers to these from all the dentists connected with local dental societies throughout the country will supply a due proportion of purely dental topics, and at the same time furnish material for a report. the discussion of which will lead to more uniform methods of practice.

"EDUCATION, LEGISLATION, AND THE DENTAL DEGREE."

THAT "complete preparation be made in each school for laboratory technique in the studies of histology, pathology, and in each of the departments of dental surgery and dental prosthesis" is the language of a memorial addressed to the National Association of Dental Faculties by the National Association of Dental Examiners. This is a special application of the manual-training idea to the needs of the dental curriculum. It has already been put into practice to some extent in a few of the dental colleges, with happy results, and the success which has followed its introduction into other departments of education proves it to be based on sound physiological principles. Broadly adopted and made a requirement, it cannot fail to greatly improve the training of students and increase their qualifications as practitioners of dentistry.

There can be but little question that the agreement signed by the Superintendent of the Census, as printed in the DENTAL COSMOS for August, will prevent further annoyance of the dentists under the present census enumeration. It was drawn up and signed in the presence of the census committee of the Senate, after a discussion of the subject with accredited representatives of the dental profession, and may therefore be considered as binding. The story of the events which led up to this conclusion was put into type for the current issue of this journal, but was unavoidably laid over. The extremely narrow margin by which the design of the Superintendent of the Census to force the dentists to give up to him reports of their business was defeated should clinch the necessity of early action to prevent a repetition of the late unpleasant experience. When legislation for the next census is in order, the dentists should see to it that a bill shall be framed which so recognizes their position as professional men that it will not be optional with any official to arbitrarily classify them as manufacturers.

The action of the National Association of Dental Faculties in passing a vote of censure on the Baltimore College of Dental Surgery for conferring the degree D.D.S. honorarily without consent, emphasizes the purpose of the association to hedge about the awarding of such honoraria with all the safeguards possible. In this purpose it will have the hearty support of the profession at large. The rule of the Faculties Association is a sound one, and seems to cover broadly all likely necessities. It reads:

"*Resolved*, That the degree of Doctor of Dental Surgery shall not be conferred by any college belonging to this association honorarily, except by the consent of this association."

The tendency to limit the conferring of honorary degrees is in accord with popular sentiment and good policy. While it is a debatable question whether a hard and fast line can be drawn, it might be well to define as nearly as possible under what circumstances and within what limitations cases for the reception of the honor can be considered. Undoubtedly cases must arise where distinguished services to the profession are deserving of some such reward, and the occurrence of a case calling for the interference of the association indicates that specific legislation should be had.

ADDITIONAL PAGES.

THE present issue of the DENTAL COSMOS contains sixteen extra pages of reading matter, and still a number of important papers and reports are unavoidably left over.

BIBLIOGRAPHICAL.

PRACTICAL NOTES ON NITROUS OXIDE (N_2O). A Brochure. By J. OTTLEY ATKINSON, L.D.S. Eng. Kendal: T. Wilson, 28 Highgate, 1892.

This small volume of thirty-eight pages is a republication of a series of papers which originally appeared in the *British Journal of Dental Science*, with some alterations, additions, and illustrations. It treats of the author's experience and methods in the practical administration of the gas, and makes no attempt at a scientific exposition of the subject.

The methods which he advocates are not such as have been found best adapted to practice in this country. For example, he states, page 5, "We have repeatedly administered the gas from the large holder during the process of manufacture, the gas being only a few minutes old, without experiencing any unpleasant result, although the extreme rawness of the gas, in a few cases, has produced a sufficient amount of irritation in the bronchial tubes to render it less desirable than gas that has been matured." Just so; and if he will carefully study the nature of the irritating products that cause the "rawness" he has noticed, he will find it not only desirable but incumbent upon him to let the gas "mature" until the water has completely absorbed these irritating if not poisonous side products of the manufacture.

The author vigorously defends the use of corks as mouth-props, and insists that they shall not have safety-strings attached.

He also holds to the use of inhalers with soft-rubber hoods or face-pieces, and in order to secure a gas-tight joint between the rim of the face-piece and the face of the "strongly bearded patient and those possessing a profusion of hair on the face," advises a liberal application of soap and water to the beard and moustache, with the object of rendering them impervious to air.

In the light of present methods in successful general use, we are inclined to look upon the brochure as a fair statement of how not to do it.

Die Orthopedische Behandlung der Sattelnase mittelst von der Zahnheilkunde gebotenen Hülfsmitteln. (The Orthopedic Treatment of Depressed Nose by Remedies within the Domain of Dentistry.) Compiled and illustrated with 82 figures by Matti Äyräpää, Teacher of Dentistry in the University of Helsingfors, Finnland.

The author gives the history of rhinoplastic operations, beginning with operations practiced in India, where restoration of the nose by means of a flap cut from the forehead was practiced as early as the year 1000 of our era. Sicily is the first place in Europe where similar operations are recorded ; there a surgeon named Branca and his son Antonio Branca in the fifteenth century restored this feature both by flaps from the forehead and from other parts of the body, especially the arm. This latter operation, from its origin, is called the Italian method. From that time these operations seem not to have been attempted, except at long intervals, in Europe until the beginning of this century, when they were renewed by English military surgeons, who may have seen similar work done in India by the native surgeons.

It was soon seen that restorations of the nose by the transference of the skin from the face or the arm, while at first very satisfactory, would not restore permanently the shape of this important member. It would sink in and lose its form, not having any bone to support it. This has led modern surgeons to supply artificial supports for the new tissue, or where the bony part of the nose only was lacking to the original tissue, and the author describes and illustrates the contrivances of metal, gold, lead, and platinum introduced to remedy this deficiency.

He gives full descriptions of nineteen cases in his own practice where he has introduced artificial supports to the nose. Where there was a pathological opening between the mouth and the nasal cavity, the support was from a plate covering the roof of the mouth, and held in place by fastenings to the teeth. In cases where no opening existed, he made one through the mouth. Only in cases where the patient would not allow such an opening to be made, he fastened the apparatus on the floor and walls of the nasal cavity.

The operations in every instance were successful in as far as they improved the appearance and restored the use of the nasal apertures for the purpose of breathing.

The pamphlet is a valuable contribution to the literature of the subject.

A TREATISE ON DENTAL JURISPRUDENCE FOR DENTISTS AND LAWYERS. By WILLIAM F. REHFUSS, D.D.S. Wilmington Dental Mfg. Co., Philadelphia, 1892. Price, cloth, $2.50 ; sheep, $3.00.

We have received a copy of Dr. Rehfuss's volume, and will shortly give it such a review as its importance demands. It constitutes a distinctly novel and valuable addition to dental literature.

OBITUARY.

DR. HERMAN R. PASEDACH.

DIED, at Tipton, Iowa, April 2, 1892, of œdema of the glottis, HERMAN R. PASEDACH, D.D.S., in the twenty-fifth year of his age.

Dr. Pasedach was born in Berlin, Germany, in 1866, and came to America at the age of fourteen. After acquiring a knowledge of English, he entered upon the study of dentistry with Dr. S. A. Garber, of Tipton, Iowa. He graduated from the dental department of the State University of Iowa, class of 1892, and entered into partnership with Dr. Garber on the first of April last.

Dr. Pasedach was an enthusiastic student, was well informed on most subjects, and had scientific tastes which led him to devote considerable time to histological investigation. He had many friends, who looked upon him as a rising man in his profession. He leaves a mother, brother, and sister in Germany.

DR. A. FISHER.

DIED, at Warren, Pa., June 30, 1892, of heart-failure, Dr. A. FISHER, in the sixty-sixth year of his age.

Dr. Fisher was born in Alsace, Germany, August 1, 1826. Coming to America, he studied dentistry, and entered into practice at Monroe, Wis., some thirty-five years ago. Going to Western Pennsylvania, he became one of the pioneers of the profession in that section of the state. In 1860 he attended lectures in Chicago. He was married in 1847 to Elizabeth Shafer, of Franklin, Pa., who survives him. He leaves two sons,—Henry Fisher, M.D., of Akron, Ohio, and Samuel J. Fisher, D.D.S., of Pittsburg, Pa. He had been a long time in practice in Warren, which he continued up to the date of his decease.

DENTAL LEGISLATION.

DISTRICT OF COLUMBIA DENTAL LAW.

FOLLOWING is the text of the law recently passed, and entitled "An act for the regulation of the practice of dentistry in the District of Columbia, and for the protection of the people from empiricism in relation thereto." The act was approved June 6, 1892.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled:

SECTION 1. That it shall be unlawful for any person to practice dentistry in the District of Columbia unless such person shall register with the health officer in compliance with the requirements hereinafter provided.

SECTION 2. That a board to carry out the purposes of this act is hereby created, to be known as the board of dental examiners, to consist of five reputable dentists resident of and for three years last before appointment actively engaged in the practice of dentistry in the District of Columbia, to be appointed by the commissioners of said district for terms of five years and until their successors are appointed: *Provided*, That the first five appointments shall be made for terms of one, two, three, four, and five years, respectively. A majority of said board shall constitute a quorum. Vacancies occurring in said board shall be filled by the appointment of eligible persons for unexpired terms.

SECTION 3. That it shall be the duty of the board of dental examiners, first, to organize by electing one of their number president and one secretary, to provide necessary books and blank forms, and publicly announce the requirements of this act, and the time, place, and means of complying with its provisions, within thirty days from its passage; second, to promptly certify to the health officer for registration all who are engaged in the practice of dentistry in said district at the time of the passage of this act who apply therefor; third, to test the fitness and pass upon the qualification of persons desiring to commence the practice of dentistry in said district after the passage of this act, and certify to the health officer for registration such as prove, under examination in theory and practice of dentistry, qualified in the judgment of the board to practice dentistry in said district; fourth, to report immediately information of any violation of this act, and, annually, the transactions of the board to the commissioners of the District of Columbia: *Provided*, That all graduates of dental colleges which require a three years' course of study shall be entitled to certificates upon payment of the certification fee, and without examination as to their qualifications.

SECTION 4. That it shall be the duty of every person practicing dentistry in said district at the time of the passage of this act to make application to said board, in form prescribed by said board, for certification, and present the certificates thus obtained for registration to the health officer within sixty days from the passage of this act. Every such person so registering may continue to practice without incurring the penalties of this act.

SECTION 5. That persons desiring to commence the practice of dentistry in said district after the passage of this act shall first obtain a certificate of qualification from the board of dental examiners, granted under authority conferred upon said board by section three of this act, and present the same to the health officer for registration.

SECTION 6. That it shall be the duty of the health officer to register all persons presenting certificates from said board in a book kept for this purpose, and indorse upon each certificate the fact and date of such registration.

SECTION 7. That certificates issued and indorsed under the provisions of this act shall be evidence of the right of the person to whom granted to practice under this act.

SECTION 8. That any one who shall practice or attempt to practice dentistry in the said district without having complied with the provisions of this act shall be deemed guilty of a misdemeanor, and, upon conviction thereof, shall be fined not less than fifty nor more than two hundred dollars, and in default of payment of such fine shall be imprisoned not less than thirty nor more than ninety days, said fines, when collected, to be paid into the treasury of the United States, to the credit of the District of Columbia: *Provided*, That nothing in this act shall be construed to interfere with physicians in the discharge of their professional duties, nor with students pursuing a regular uninterrupted dental college course or in *bona fide* pupilage with a registered dentist.

SECTION 9. That to provide a fund to carry out and enforce the provisions of this act the board of dental examiners may charge such fees, not exceeding one dollar for each certificate and ten dollars for each examination, as will from time to time, in the opinion of said board, approved by said commissioners, be necessary. From such fund all expenses shall be paid by the board: *Provided*, That such expense shall in no case exceed the balance of receipts.

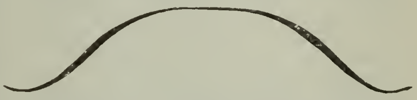
The board of examiners appointed under this act is constituted as follows: Dr. Williams Donnally, president; Dr. L. C. F. Hugo, secretary; Dr. John B. Rich, and Dr. H B. Noble.

HINTS AND QUERIES.

Holbrook's Patent Dental Plate.—At the request of the inventor, Dr. W. D. Holbrook, Watertown, N. Y., formerly of Waukesha, Wis., we publish the following description of his process for improving the fit of artificial dentures, and by his authority state that he presents it to the dental profession now and henceforth for their unrestricted use. Having fully tested it and found it valuable in his practice, he desires to confer its benefits upon others.—Editor Dental Cosmos.

For Lower Dentures.—Take a full and perfect impression in wax. Press it well to the jaw. In this, take the impression again in plaster of Paris. From the bottom of this plaster impression scrape out evenly, to a depth equal to the thickness of a No. 3 separating file, one-sixteenth of an inch nearly, from end to end. Leave about one-fourth inch, for the ends of the plate, untouched. A cast taken from this will have a raised ridge, and a plate made upon this cast will have an air-space between the jaw and plate. This will allow the plate to rest upon the soft tissue on each side of the central bone, like a saddle upon the back of a horse, instead of hanging upon the bone as it does in most cases. Let the plate run down as deep as possible, and be thick enough to round off the edges inside and out. Do not disturb the sides of impression or cast, for this is the bearing.

For Upper Dentures.—Take the impression as for lower dentures, described above. Scrape out from the impression the whole length of the median line. Now find how far the hard, bony surface in the roof extends, and scrape off the impression to correspond with the bony part, not heavily, but lightly enough to relieve it from pressure. Do not scrape off where the mouth is soft. A cast taken from this impression will be raised just as much as you have taken from the impression, and the plate will not rock on the center. Now cut into the cast on a line between the hard and soft palate for the back edge of the plate. Begin a half-inch or less forward of the cut line, and chamfer it down to a depth of one-sixteenth of an inch or less, as the case may be. If soft, cut deep where softest, and less where hard. Be sure and get the back edge of the plate up to the roof snugly; dentists have ever failed to do this. Make the back edge of the plate thin as a case-knife edge, then soften it in hot water (if rubber) and press it firmly to the mouth. Use a strip of fine tea-lead around the border of the casts, and it will prevent holes in the border of your plate; or, what is better, use for base-plate four or five thicknesses of fine tea-lead, each burnished down into the rugæ, and the plate will be of uniform thickness.



Back edge of plate, showing how much it may be raised when the mouth is soft, but to be varied as it is soft or hard.

N. B.—A plaster cast taken from the lower jaw, when the alveolar border is very thin and sharp, will condense when under screw pressure in bringing the flasks together, in rubber or celluloid work; so will a metal cast under heavy blows in swaging a plate. Just as much as the cast settles, just that much will the plate lack of being as deep as the jaw it was designed for, and it will ride upon the central bone. The process described overcomes the difficulty, and secures a suction in a large majority of cases. A thick, heavy border will not settle so much, therefore less scraping out is required, but in all cases raise the cast, more where thin, less where thick, but do not scrape out too much, and *only* from the bottom of the impression. When the border is all absorbed and nothing but a flat surface left, you will continue the scraping out around the circle where the bone ought to be. This will give suction.

Upper Plates.—On the palatine or back side of the cut line for the back edge of the plate, you will leave it untouched. Do not disturb it, the cut line being at right angles with the cast; it gives you a guide to go by, showing just how high you are raising the back edge of the plate. This done, your whole plate is a suction. Follow well these instructions, and you will succeed and be in possession of the best system ever given to the profession, and you will realize that your troubles are over in this line of work.—W. D. HOLBROOK.

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

The abbreviations of titles used are those common to bibliographical work, and will, it is presumed, be readily comprehended by any one familiar with dental or scientific publications. Any explanation will be gladly furnished by the compiler. A star (*) indicates a Thesis.

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LIST OF UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING JULY, 1892.

July 5.—No. 478,217, to CHAS. E. BLAKE. Forceps.
" " No. 478,312, to M. R. B. CREERY. Flask clamp.
" " No. 478,343, to C. P. LENNOX. Dental tool.
July 12.—No. 478,589, to WM. H. GILBERT. Dental chair.
" " No. 478,590, to A. P. GOULD. Dental chair.
" " No. 478,672, to B. M. WILKERSON. Dental chair.
" " No. 478,871, to J. JOHNSON. Vulcanizer.
" " No. 478,881, to E. C. MOORE. Disk-holder.
" " No. 478,943, to GEO., M. O., and J. G. REHFUSS. Hand-piece.
" " No. 21,428, Trade-Mark, to W. E. BURROWS. Tooth-powder.
July 19.—No. 478,992, to F. A. DAMON. Dental engine.
July 26.—No. 479,407, to JOHN M. DRENNAN. Syringe.
" " No. 479,415, to T. H. & E. GARDNER. Chair.
" " No. 479,585, to R. E. CHERRINGTON. Head-rest.

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ORIGINAL COMMUNICATIONS.

THE HERBST METHOD OF TREATING PULPS.

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(Read before the annual meeting of the Dental Society of the State of New York, May 12, 1892.)

ONE of the most difficult and tedious operations the members of our profession are called upon to perform is the successful treatment of pulp-canals of the teeth, especially those of the first upper bicuspids, the buccal roots of upper molars, and the anterior roots of lower molars.

In many instances the canals in the above-named teeth are so constricted and tortuous that, even with the finest instruments and the greatest skill and perseverance, we are unable to reach the apex of the root. We all know what serious consequences sometimes result from a root which has not been properly filled, especially in people who, from anemia or from some cachectic condition, are predisposed to necrosis, empyema of the antrum, or cystic formations. In consequence of the great experience, time, and patience which are required to prepare most of the pulp-canals, Dr. Wilhelm Herbst, of Bremen, has tried to simplify this method, and found a procedure which, as far as I am able to judge, promises to be successful.

Although my own experience in this direction is but limited, I have taken the liberty to present the subject before this society, as it is a matter of the greatest importance to all of us.

About seven years ago, when Dr. Herbst was in this country, he told me of his new method of treating pulps; but as it appeared to me then to be adverse to all our present teachings, and utterly unscientific, I advised him to abstain from any further experiments in this direction. I also called his attention to an article, "Iodoform in Dental Surgery," published in the *Independent Practitioner* of March and April, 1884. In this paper I described a method of treatment of root-canals which was pursued in two hundred and thirty-one pulpless teeth.

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* For the drawings, as well as other valuable assistance in the preparation of this paper, I am indebted to Dr. Carl Heitzmann.

On page 179 I stated, "In some instances we can open the pulp-chamber of a pulpless tooth, which usually contains a great deal of septic matter, clean it out, fill it at once, and no trouble whatever will arise. In these cases the end of the root is encysted, and any kind of filling-material, or even no filling at all, will answer the purpose." I furthermore explained to Dr. Herbst that, if his treatment was successful, it could only be because his new method caused a perfect encystment of, or closing up of the foramen of the apex of the root, which to me was very problematical. After this interview Dr. Herbst told me that when he returned to Germany he would treat pulp-canals in the manner practiced in this country; but one year later he wrote me that he was again experimenting with pulps by his method, with great success. I again requested him, in the strongest language I could find, to give it up. Although Dr. Herbst, in his letters to me after that time, mentioned nothing more about his method, he induced other practitioners of Germany to experiment in this direction, and the results were published from time to time in the German dental journals. At first I paid little attention to these reports; but when Dr. Schultz, who has been in Dr. Herbst's office about two years, assured me that he had observed very few failures in the cases operated upon by Dr. Herbst, I began to turn the thing over in my mind. I wrote Dr. Herbst to procure for me some of the teeth which had been in the mouth of the patient at least one year after the operation had been performed, promising him that, if I should find their condition in accordance with his statements, I would give the result of my investigations before a dental society of this country. I may state here that I was very much surprised at the result of my investigations, and consequently began to make some experiments for myself.

Fig. 1.

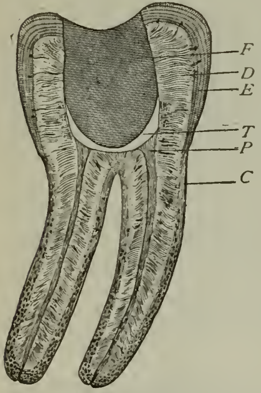


Diagram of molar treated by Dr. Herbst. *F*, filling; *D*, dentine; *E*, enamel; *T*, tin cap over pulp-stumps; *P*, pulp; *C*, cementum.

The methods of practice observed by Dr. Herbst are as follows: If the pulp of a tooth is in such a condition that it becomes necessary to remove it, an application of cobalt, to which has been added about eight per cent. of hydrochlorate of cocaine, is made to it, and covered with wax or some other temporary filling-material. After two or three days the temporary filling is removed, the cavity cleansed from all decay, and rinsed out with water. Then, if practicable, the rubber-dam is adjusted, the cavity thoroughly disinfected, and the coronal portion of the pulp is amputated by means of a large, perfectly clean, sharp, round bur, which is rapidly revolved in the hand-piece of the dental engine. The bur must be nearly as large as the coronal portion of the pulp which is to be amputated. The pulp-chamber is then to be washed out with a solution of corrosive sublimate of the strength of one-tenth of one per cent., and dried. A cylinder, or a loosely rolled ball of No. 4 tin foil, as large as the cavity will admit, is now placed in the pulp-chamber directly over the amputated pulp-stump, and with a revolving, smooth burnisher, which is smaller than the pulp-chamber, the tin is burnished firmly into it. In burnishing, care should be exercised not to press the tin directly upon the pulp-stump, but the force should be exerted more laterally. It is also necessary that the stumps to be capped in this manner be not irritated with small burs, excavators, or nerve-instruments, as failure has been observed in those cases in which this was done. Dr. Herbst also advises that in case the tooth becomes sensitive to pressure after such an operation, it should be shortened a little, and the filling in the tooth not left high enough to touch the antagonizing tooth. If amalgam is employed, it is advisable to place a small particle of wax upon the tin cap, and distribute it over the surface of the tin by means of the rotating burnisher. If this precaution is neglected, the mercury of the amalgam will combine with the tin, and the efficiency of the cap be destroyed.

The theory entertained by Dr. Herbst in regard to this treatment of pulps is, that by burnishing tin or gold into the pulp-cavity, he creates an absolutely air-tight covering to the root-canal, which is not obtainable with other materials. Dr. Herbst claims that good results cannot be expected by the use of amalgam, cement, or gutta-percha, and even tin and gold foils introduced into the pulp-chamber by the mallet system have proved to be failures. In cases of front teeth, he employs gold foil instead of tin,—as he claims, with equally good results.

In regard to the origin of this method, Herbst writes me as follows: "Formerly, when during the process of excavating I exposed a pulp, I capped it with a soft cylinder of gold, burnishing it very carefully over the pulp. It sometimes happened that afterward the tooth decayed in another place, the filling coming out or the tooth being extracted, when in every instance upon opening the pulp-chamber I found it empty, and without the slightest perceptible odor. The color of these teeth was never changed much, and often there was no perceptible difference between them and the living. These cases led me to assume that the results were dependent upon the air-tight covering of tin or gold which had been burnished over the pulp by the rotation method of filling."

My own experience in this method, as mentioned before, is rather limited: up to March 25 last, I had performed fourteen such operations. Five of the most typical cases I will describe. In all of these I have placed gutta-percha over the tin cap, which I intend to remove again at some future time, and some of these teeth were sixth-year molars, which I intend to extract later on.

Case 1.—Miss U., about fourteen years of age; good constitution. The left lower first molar was found badly decayed, with acute pulpitis. An application of cobalt was made, which produced very little pain. Two days later the coronal portion of the pulp was amputated, giving but little distress to the patient. The tin cap was introduced in the manner before described. One day after this the tooth was comfortable, and the patient was able to use it again for mastication.

Case 2.—Mr. B., about forty-five years of age; good constitution. Suffering from pulpitis of the left upper second molar, which had a large cavity in the mesial surface under the gum. Cobalt was applied for two days, during the first twelve hours producing considerable pain. The amputation of the pulp gave little pain, and after the tin cap had been adjusted the tooth was comfortable, but it remained sensitive to thermal changes for about one week.

Case 3.—Mrs. I., age about thirty-five years; very nervous organization. The right upper first molar had been afflicted with chronic pulpitis. The pulp, through caries, was exposed over one year, and every attempt to cap and fill it resulted in failure. Then an effort was made to destroy it, first with arsenious acid, and then with cobalt; but neither of these applications could be left in contact with the pulp longer than from thirty to forty minutes, as the pain became too severe for the patient to bear. I then made an application with the methylic spray, which caused excruciating pain; but I was enabled to amputate the pulp without much sensation. Upon opening the pulp-chamber, I found a number of pulp-stones, some adherent to the walls of the dentine, others loose in the body of the pulp. The tooth remained sensitive to thermal changes for nearly three months, but after that time it became perfectly comfortable.

Case 4.—Mr. E., eleven years of age; good constitution. The right lower first molar was found largely decayed, and the patient suffering from acute pulpitis. An application of cobalt was made, which gave but little discomfort to the patient. After two days an attempt was made to amputate the pulp, which, however, was found to be too sensitive, necessitating another application of cobalt, which after two days gave satisfactory results, when the pulp was amputated and the tin cap applied. After the adjustment of the tin cap the tooth became comfortable at once, and has given no trouble since.

Case 5.—Mrs. R., about forty-eight years of age; good constitution, though nervously excitable during the last twelve months. A right upper first molar had a cavity in its distal surface, with chronic pulpitis, for nearly one year. Although the pain could not be located in this tooth by the patient, it proved to be the cause of the trouble. An application of cobalt produced violent pain, and had to be removed after one hour. The next day I made an application with the methylic spray, which produced very severe pain, but the amputation of the pulp could then be borne. The pulp-chamber was found to be nearly obliterated, and full of new formations of bone and dentine. The introduction of the tin cap also produced some pain, which lasted several hours. The tooth remained sensitive to thermal changes over two months, which sensitiveness returns whenever the patient does not feel quite well. At other times the tooth is serviceable.

Every one of these fourteen teeth, the pulps of which I have treated in the manner described, have been successful, with the exception of Case No. 5, which is due to constitutional disturbances. I shall watch these teeth carefully, and after about one year I shall open and examine as many of them as I can, and report again to this society. In all the cases I have treated I have observed no pericemental disturbances, the teeth having never been sensitive to percussion, except Case No. 5, which at times has shown slight soreness. The cause for a slight pericementitis after the amputation and capping of such pulps is probably that no septic matter has been allowed to enter the pulp-canals before the introduction of the tin cap. Dr. Herbst informs me that he does not make much use of antiseptics in this connection, nor does he always apply the rubber-dam before he amputates the pulp, which may probably account for the slight pericementitis of these teeth as described by him. I would therefore advise every one who tries this method of amputating and capping pulps to exercise the greatest possible care against the entrance of organisms into the pulp-canals which are intended to be capped. Although many pulps are in a septic condition before they come into our hands, yet in the majority of instances sepsis does not extend below the coronal portion of the pulp, and in these latter cases I believe pericementitis can be avoided.

One of the teeth, an inferior molar, which Dr. Herbst sent to me for examination, was amputated and capped by him in the manner above described about three years ago, and had been in a normal condition until it was extracted. The tooth was removed on account of an overcrowded condition of the dental arch, as well as to obtain a specimen for examination. Immediately after extraction it was immersed in dilute alcohol, in which it was sent to this country. Upon its arrival here it was placed in a solution of chromic acid of the strength of one per cent., which solution was renewed every day until the dentine became sufficiently soft to be sliced by the microtome. For staining, an ammoniacal solution of carmine, and for mounting, glycerin, were employed.

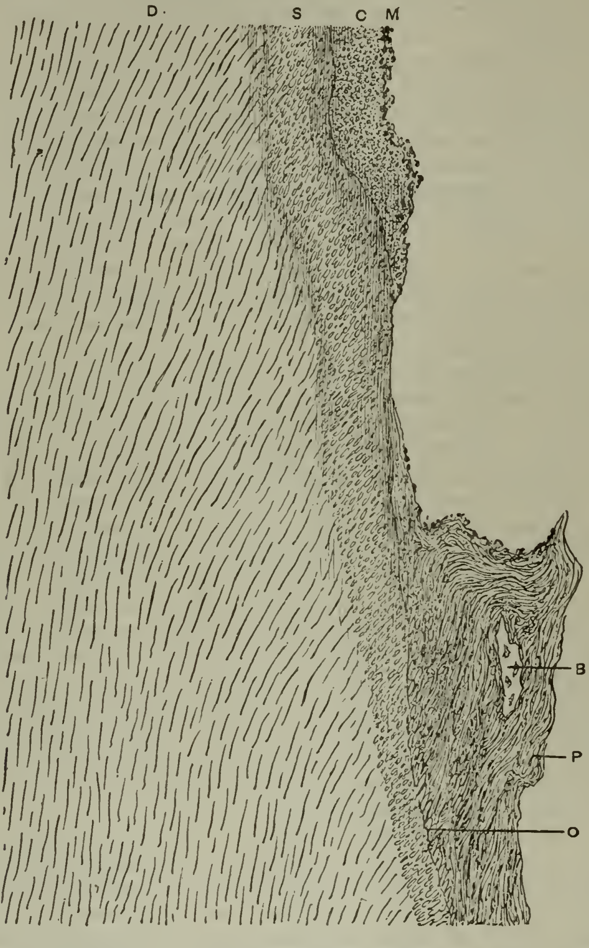
A longitudinal section through the crown and one of the roots of this tooth yielded an image as depicted in Fig. 2. In the pulp-cavity of the crown we see remnants of a narrow zone of previously inflamed, necrotic tissue. The outermost border of this layer is conspicuous because of the presence of black metallic particles, probably the tin foil in combination with sulphur. At the point of bifurcation the pulp is preserved, though changed into a fibrous connective tissue by the process of chronic plastic pulpitis, which I have described in a publication, "The Minute Anatomy, Physiology, Pathology, and Therapeutics of the Dental Pulp." (DENTAL COSMOS, June, 1882.)

In this fibrous pulp we observe small spiculæ of bone-tissue. The boundary zone between the pulp and the dentine shows narrow rows of calcified elongated corpuscles, similar to those which we often observe along the border between the cementum and pericementum of the neck and the roots of normal teeth. The border of the pulp, toward the pulp-cavity, which had been filled with tin, is likewise marked by metallic particles, which proves that the tin actually has been in contact with the pulp-tissue.

The border of the dentine, both in the crown and the root, is of considerable interest. In the crown the dentine toward the necrotic pulp is thoroughly calcified, without a pronounced structure, evidently in the condition of consolidation and augmented deposition of lime-salts, such as we often observe in dentine bordering metallic fillings. All along the pulp-canal the dentine is broken up into small globular and oblong corpuscles, obviously the result of a previous acute eburnitis, with subsequent deposition of lime-salts. This peculiarly altered zone of dentine is broadest along the pulp-chamber of the crown, and gradually tapers along the pulp-canal of the root, while toward the apex it altogether disappears.

A portion of this wall of the pulp-chamber of the crown is illustrated in Fig. 3. Here we observe a layer of necrotic pulp-tissue, with metallic particles at the outermost periphery. The pulp, before it became necrotic by the action of cobalt, must have been in a condition of intense acute pulpitis, which is proved by the presence of numerous vestiges of inflammatory corpuscles. The necrotic pulp shows even remnants of non-medullated nerve-fibers, likewise in a granular disintegrated condition.

FIG. 2.



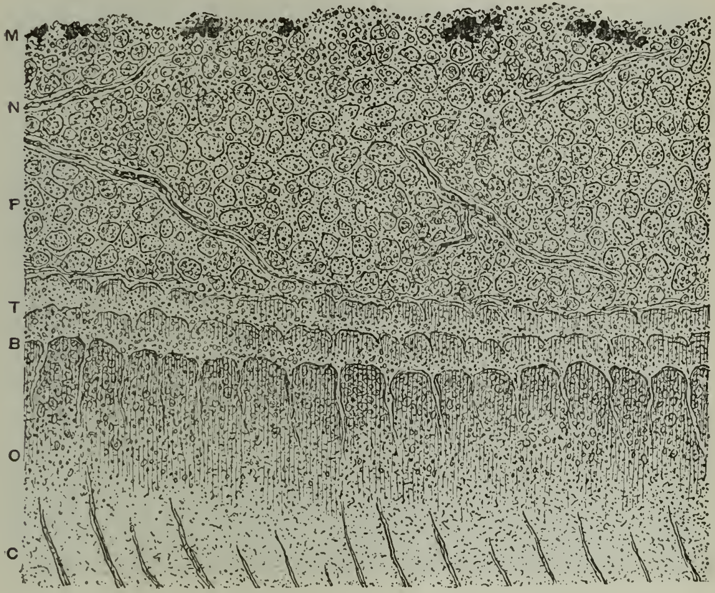
Section of lower molar, border of pulp-chamber, near bifurcation of roots. × 100. *D*, dentine, canaliculi cut obliquely; *S*, secondary changes of dentine; *C*, colonies of micrococci in dead pulp; *M*, black particles of metal; *P*, fibrous pulp, the result of chronic plastic pulpitis; *O*, osteoid layer of pulp at the border of dentine; *B*, spiculæ of newly-formed bone.

In some of my specimens, in the dead pulp I could trace colonies of micrococci, developed during the process of pulpitis, and deprived of life and rendered innocuous by the application of cobalt and contact with the tin.

In that portion of dentine depicted in Fig. 2, a zone is missing. The dentine borders the dead pulp in an abrupt line, conspicuous by regular, though widened and funnel-shaped, dentinal canaliculi. It seems probable to me that the widening of the canaliculi is the result of an acute pulpitis, which did not last long enough to induce pronounced changes in the tissue of the dentine. The border zone of the dentine is granular, and followed by a zone of consolidation in which the dentinal canaliculi have completely disappeared. Possibly the whole border of the dentine toward the necrotic pulp is devitalized down to the region in which dentinal canaliculi and unchanged dentinal fibers are observed. The pulp of the crown, however, is not altogether necrotic ; there are portions within the crown still supplied with a narrow layer of living pulp, as shown in Fig. 4.

These vestiges of the pulp are broken up into protoplasmic bodies, which in part have become the seat of calcareous deposits. The only way to explain this remarkable feature is that a thin film of the inflamed pulp has escaped both the process of cauterization with cobalt and destruction of the amputation. The zone of dentine nearest to the pulp is consolidated, as shown by its high refraction under the microscope ; but even this consolidated portion is pierced by unchanged dentinal canaliculi holding normal dentinal fibers. The dentine along the pulp-chamber of the crown in many instances exhibits a peculiar black discoloration, which I have often observed in dentine that has been in contact with an amalgam filling. Strange as it may appear, it is nevertheless a fact that the discoloration does not start from the border of the dentine, but a certain distance away from it. As shown in Fig. 3, the discoloration is caused by the presence

FIG. 3.

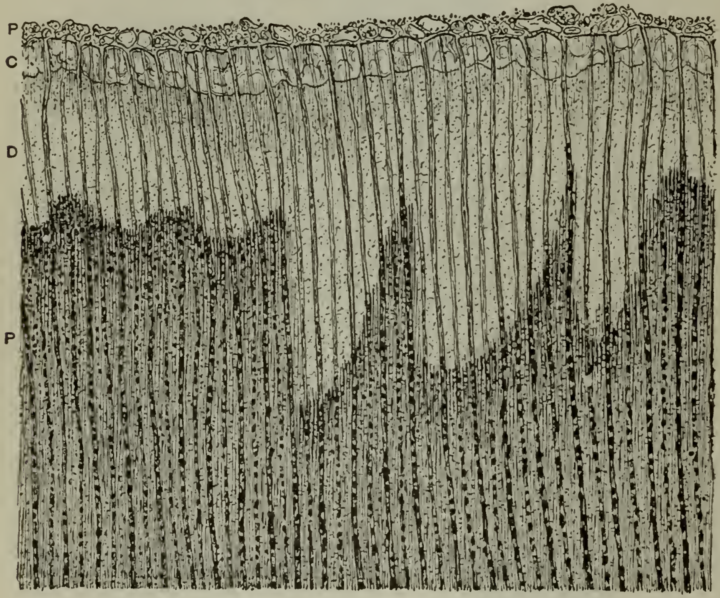


Border of pulp-chamber of the crown. × 500. *P*, necrotic remnants of the pulp ; *M*, black particles of metal at the surface ; *N*, necrotic vestiges of non-medullated nerves ; *B*, border of dentine, with gaping dentinal canaliculi ; *O*, region of obliterated dentinal canaliculi ; *C*, pointed ends of dentinal canaliculi.

of metallic particles, lying as if arranged in rows within the dentinal canaliculi, and by the diffused brown pigmentation of the basis-substance between the canaliculi. The latter color is most intense in an abrupt line, irregular in itself, toward the pulp-chamber. The peculiar discoloration is explicable only by admitting a transportation of metallic particles by the dentinal fibers, a strong proof of the life of both the dentinal fibers and the basis-substance of the dentine.

I have stated before that the pulp of the root-canals, beginning from the point of bifurcation, is transformed into fibrous connective tissue. The nature of this transformation is rendered clear by higher powers of the microscope. (See Fig. 5.)

FIG. 4.



Border of pulp-chamber of the crown. × 500. *P*, protoplasmic layer of inflamed pulp; *C*, zone of consolidation of dentine; *D*, dentine, with canaliculi without deposits; *P*, dentine in which the canaliculi are loaded with metallic particles.

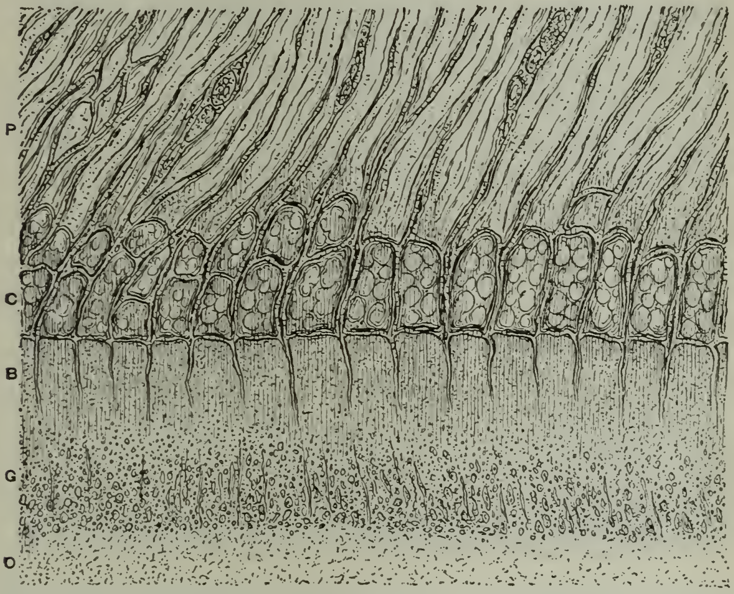
The pulp-tissue is really made up of bundles of fibrous connective tissue, almost as broad as those of pericementum, periosteum, or the derma of the skin. Between the bundles we notice interstices of varying breadth filled with protoplasm, as we always observe in formations of fibrous connective tissue. The bundles toward the dentine terminate in calcified, elongated clusters, corresponding on an average with the breadth of the bundles themselves. The most striking feature is that the interstices between the calcified lumps and the bundles above these lumps contain fibers similar to dentinal fibers. The border of the dentine toward the fibrous pulp is slightly consolidated; that is, somewhat richer in lime-salts than the rest of the dentine. This consolidated layer is followed by a granular one, which is scantily provided with lime-salts, containing vestiges of dentinal canaliculi.

Next follows a layer of dentine in which the dentinal canaliculi are obliterated, which a little farther away appears with pointed ends holding normal fibrillæ.

In Fig. 2 Dr. Heitzmann has illustrated a small spicula of bone in the pulp-tissue, which is of considerable interest when studied with higher powers of the microscope. (See Fig. 6.)

Here we observe normally developed bone-tissue, but lacking Haversian canals and regular lamellæ. We also see the manner in which bone-tissue is developed from the fibrous connective tissue of the pulp. This is accomplished by the intervening formation of a medullary or embryonal tissue (see *M*), from which the bone-corpuscles, as well as the basis-substance of the bone-tissue, are forming. The formation of bone is not of uniform progress all around this spicula, as we observe a bordering of the bone by a fibrous tissue, in some places unchanged, in others slightly reduced to protoplasm. The transformation of the medullary into the bone-tissue is not always an immediate one. In some places we notice calcified groups of medullary corpuscles (see *C*) preceding ossification. Unquestionably the lime-salts of such clusters must be dissolved out again before the final appearance of the bone-tissue proper.

FIG. 5.

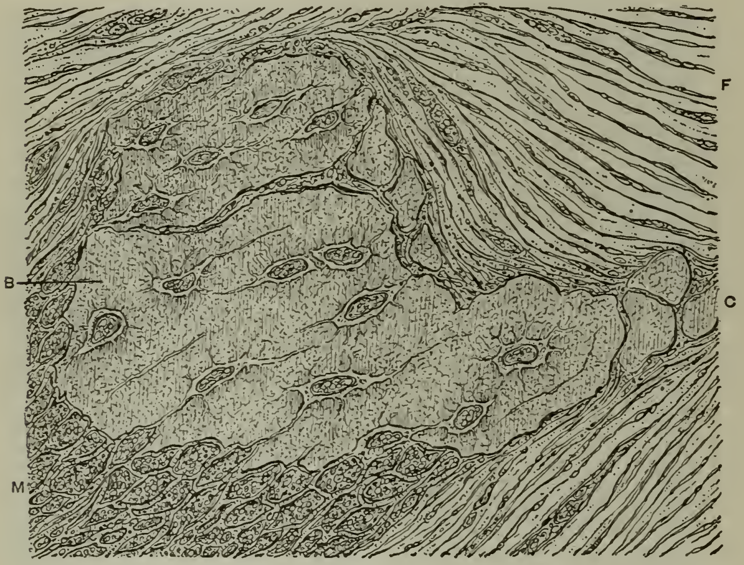


Border of pulp-chamber. × 500. *P*, fibrous pulp, the result of chronic plastic pulpitis; *C*, calcified layer of pulp; *B*, border of dentine; *G*, granular layer of dentine; *O*, layer with obliterated dentinal canaliculi.

The microscopical analysis of this molar is of considerable biological importance. The dentine was found alive, its fibers unchanged throughout the crown and the roots, except a narrow zone which bordered the portion of necrotic pulp. This result is explicable only by the fact that the pulp of the roots, although changed in structure, is still alive. The proof of this assertion is furnished by examining the specimens with high powers of the microscope, as seen in Fig. 7.

We observe all the bundles of the fibrous connective tissue traversed by a delicate reticulum, without resorting to any special staining process. This reticulum of living matter inosculates with the protoplasm between the bundles, and with the fibers which appear like dentinal fibrillæ in the interstices between the bundles. A similar reticulum is noticeable in the consolidated as well as in the granular layers of the dentine. Obviously, the living pulp of the roots, assisted by the nutrition derived from the pericementum, kept the dentine of the whole tooth alive. If the dentinal fibers in the canaliculi were the only living formations of the dentine, nothing but the dentine of the roots could have remained alive after the destruction of the coronal portion of the pulp in the crown of the tooth. Since, however, the whole of the dentine has remained alive, we have another strong proof of interconnections between the dentinal fibers. These interconnections are established by the delicate reticulum of living matter pervading the basis-substance of the dentine. The presence of this reticulum I suggested in 1878, but it was conclusively proven by Dr. John I. Hart in 1891.

FIG. 6.



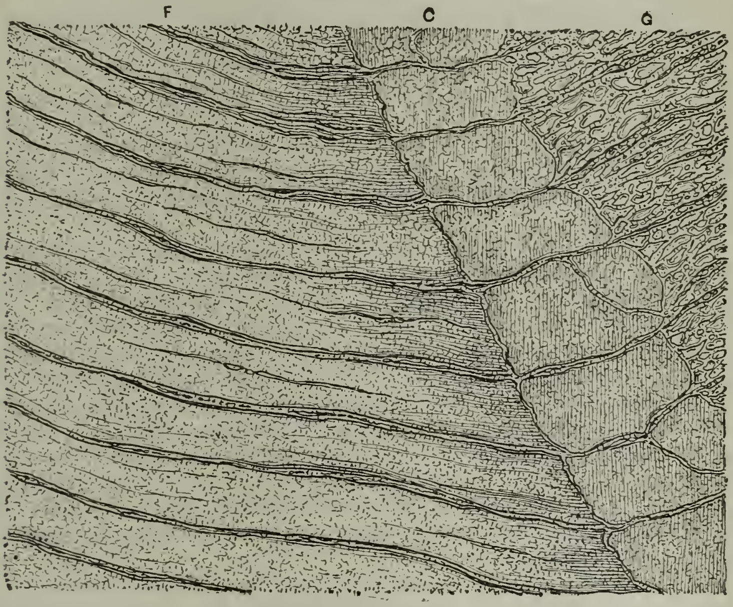
Ossification of fibrous pulp. × 500. *F*, coarse bundles of fibrous pulp, derived from chronic plastic pulpitis; *B*, spiculæ of bone, with bone-corpuscles; *C*, calcification of pulp-tissue preceding ossification; *M*, medullary tissue.

Another lower molar was sent to me by Dr. Herbst. It had remained in the mouth about eighteen months after the pulp had been amputated and capped in the manner before described. The tooth had given no trouble since the operation, and was extracted for the same reason as the one mentioned before.

This tooth was not decalcified in a solution of chromic acid, but split into several pieces by excising forceps, and ground thin upon a corundum wheel in the lathe, constantly keeping it under an aqueous solution of salt.

The roots of this tooth contained but a narrow mass of pulp-tissue, crowded with globular deposits of lime-salts, and in the process of formation of secondary dentine. The latter was found developed all along the walls of the root-canals in a heavy mass, interposed between the primary dentine and the remnants of pulp-tissue. It consisted of the most common variety, viz., wavy and irregular canaliculi, traversing the basis-substance. The production of such secondary dentine from the pulp-tissue of the roots is a strong proof of the life of the pulp, which, having been irritated less than the tooth first described, directly led to the formation of secondary dentine.

FIG. 7.



Border of dentine of root toward the pulp. × 1000. *G*, granular layer of dentine; *C*, thoroughly calcified layer of dentine; *F*, fibrous pulp made up of coarse bundles.

In concluding this paper, I will state that although these two specimens without doubt prove this treatment to be a great success, and one of the most valuable procedures ever discovered in dentistry, yet I would advise my professional brethren not to practice it too hastily.

To establish a correct theory requires more extended and careful observation than I am able to furnish at present; but if many of you will make experiments, especially in the teeth of overcrowded arches, with a view of extracting them later on, I have no doubt that we will, in a comparatively short space of time, be in possession of scientific facts about this method. I certainly would not advise the attempt to extract living pulps from the buccal roots of the upper molars, the mesial roots of lower molars, or of any roots of the wisdom-teeth, as in the majority of cases these roots are inaccessible.

If, therefore, we remove the pulps from those roots which we know can be prepared easily, and treat them in the manner we have been accustomed to, but amputate and cap the others, I am certain that most dental practitioners will have more success and pleasure in the treatment of pulpless teeth than ever before.

THE TREATMENT OF IRREGULARITIES OF THE TEETH.

BY EUGENE S. TALBOT, M.D., D.D.S., CHICAGO, ILL.

(Read before the annual meeting of the Dental Society of the State of New York, May 11, 1892.)

In the preparation of a paper upon this subject for a meeting like this, it is difficult to decide what to say and what not to say, because it covers so much ground. What I shall say, however, will be upon phases that I hope will draw out discussion.

According to a well-known authority,* one of the earliest writers to mention treatment of irregularities of the teeth was Egenolff, in 1541. To show the vast stride of advance made since then, I will quote from the translation of his pamphlet: "It often happens that to children more than seven years of age, when the teeth begin to drop out, other teeth grow by the side of those which are about to fall out; therefore we should loosen the tooth about falling out from the gums, and move it often to and fro until it can be taken out, and then push the new one every day toward the place where the first one was, until it sets there and fits among the others; for if you neglect to attend to this the old teeth will remain, become black, and the young one will be impeded from growing straight and can no more be pushed to its right place."

It is evident from these remarks that it is only within the last three hundred years that much thought has been given to this subject, and that the slight knowledge of treatment for irregularities at that time and for some time subsequently was of a prophylactic nature; that is, it was confined entirely to the management of the teeth of the first set, with the view of proper eruption of the second set. Evidently only such irregularities as were being caused by the deciduous teeth were regarded as within the power of man to correct. Could it be that there were not as many such cases then as now? I have examined large collections of old skulls in Europe and America, and found no V or saddle arches, or any variations of them. It would seem that this is an indication that perhaps these forms of irregularities are of comparatively modern origin.

In previous papers I have shown that irregularities of the teeth are now on the increase. I have also shown that there seems to be no plan by which this increase can be checked, unless it be in the care of children's teeth, and the observance of common-sense rules regarding extraction of the adult teeth.

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* Farrar's Treatise on Irregularities.

While dentistry has been practiced in this country for more than a century, I have been unable to find a single mention of the correction of any of the constitutional forms of irregularities prior to the year 1859, at which time mention was made by Dr. Westcott, in an article upon the subject of what he denominated "Expansion of the Upper Dental Arch."* Brief mention had been made of the cause of these deformities, however, as early as 1825.† This shows that, while the very able practitioners at that period were well versed in theories and the plans of operations then in vogue, they had written little and accomplished less in the line of invention of mechanisms for the correction of such deformities. In this alone, may we not see some evidence that aberrations in the jaws and teeth were then uncommon, or else that they were regarded as impossible to correct? Since that time, however, we know that knowledge of treatment for correction of irregularities has increased rapidly, and that it has now become a specialty.

The subject of irregularities of the teeth and their correction is a branch of surgery that requires special attention, special education, special training. In 1878, Dr. Farrar, feeling that the importance of this branch of dentistry was not appreciated, made considerable effort to show that it should be taught to greater extent in our professional schools. Indeed, he tried to urge upon some of the members of the faculties of two or three colleges the matter of establishing a special chair upon the branch, but at the time no one except himself appeared to feel that there was sufficient to the subject of irregularities of the teeth and their correction to warrant any such effort. Since that time a great change has taken place in professional opinion; so great is this change that I believe that if the time has not already come, it is not far off when every first-class dental college will have such a chair.

I have frequently observed cases that were disfigured and ruined for life, by incompetency. Probably many persons present have seen similar cases. Three cases that were mismanaged have come under my care during the past twelve months; the first one a woman of fine appearance, who had lost her upper lateral incisors and called upon a dentist for treatment. He attempted to draw the cuspids into close proximity to the central incisors. The woman had given her entire vacation and all her money for this operation, and then it was only partially successful. That such an operation was wrong needs but little argument. The expression of the mouth was pointed, and the features were otherwise distorted. Had a small plate bearing lateral incisors been inserted in the space, instead of having had the cuspids moved, the facial expression would have been improved instead of injured.

Case No. 2 is that of a young man with what seemed at first and what an old practitioner had regarded as a "prognathous lower maxilla." This I found upon inspection to be caused by arrested development of the upper maxilla. This dentist had spent five years in trying to reduce the deformity. It was fortunate, however, that he was unsuccessful, for had he succeeded the deformity would have been made greater than it was. Instead of moving the lower teeth back, the upper teeth should have been moved forward. In six months' treatment by this plan, the teeth were corrected and the face was greatly improved.

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* DENTAL COSMOS, September, 1859; *American Journal.*

† See "Irregularities of the Teeth" (Talbot).

The third case was one that occurred in my early practice. To make room for the anterior teeth to be carried backward, I extracted a tooth upon one side only. The result was that the incisors moved around to that side, causing an unsightly appearance. Fortunately, however, I have been able to correct this condition by extracting one on the other side. These mistakes are frequently made by dentists. Of course, I do not wish it inferred that two teeth should be taken in all cases. As one author* suggests, "the relation of the line between the centrals to the median line of the face should determine in the main the question as to whether one or two teeth should be extracted, because sometimes the centrals are at a considerable distance to one side of their proper place. The nose is generally the best guide for determining this esthetic question, the exceptions being when the nose is at one side of the median line of the face. Even then the septum of the nose should influence this matter, as well as the median line of the face."

From these cases, as samples of many, we see that to correct irregularities of the teeth we should have a broad knowledge of the human body. It is not sufficient that a dentist understands mechanics and physics; he should have considerable knowledge of high art. In truth, the specialist should be what may be called a scientific man,—well read in evolution, anthropology, ethnology, as well as in anatomy of the human face. No dentist ever lived whose intellect was too great or whose education was too extensive for the profession of dentistry. Of course he should understand physiology, pathology, and especially the subject of absorption and deposition of new matter, and the influence that the condition of the patient has upon these two processes, and also the unfavorable results that may arise from too much irritation from moving the teeth too rapidly. He should also have the kind of education that will enable him to observe any derangement of the system that may result from strain,—a result that is especially liable to occur in delicate children at an age when teeth can be moved most easily. Such knowledge will better enable him to discover the cause of the deformity, and in many cases aid him in deciding the kind of treatment that will best correct that deformity. Not long ago I heard of a young lady being confined to her house, and part of the time to her bed, for two years, as a result of having her teeth regulated. This case was treated by a dentist who thinks it is not necessary to know anything about general medicine in order to practice dentistry, and he is a teacher, too.

Irregularities of the teeth cannot always be prevented. There are, however, two causes of irregularity that might be prevented,—that which results from lack of proper care of the deciduous teeth, and that from extraction of the first adult molars. I regard these two sources as great causes of arrest of development of the jaws. I mean the alveolar ridges and the dental arches. We are all aware that the deciduous teeth generally decay early, and that they are frequently extracted long before the proper time. Some dentists do not feel the importance of preserving the deciduous teeth until they are to be soon replaced by their successors. The object of preserving deciduous teeth is to prevent the second teeth from erupting upon their territory. Especially is this true of the first adult molars, which, if not prevented from moving forward, will encroach upon the space necessary for the second bicuspids.

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*J. N. Farrar.

It has been the practice with some dentists to teach pupils that it is proper to extract these first molars, because "the jaw is crowded"; that "by the extraction of these four teeth, room will be made for the remainder to appear in line." One dentist said that his father invariably removed these teeth for the purpose of preventing irregularities, and that it would be impossible to find a single person over seven years of age in his neighborhood that could show a first "permanent" molar. I think that the habit of extracting the first adult molars during the past forty years has done more to cause arrest of development of the alveolar ridge than any other thing.

In reply to a letter written to a dentist of Glasgow, requesting him to "measure the distance from one first molar across the arch to the opposite molar," he said that if he tried he would not be able to find three hundred adults in his whole country who would have their first molars. Another dentist of many years' experience has lately published in this country an article advocating the extraction of these first molars as a means of prevention of irregularities of the teeth. Thus it will be seen that even in this late day the followers of this pernicious habit still exist.

In a few cases such extraction might be beneficial, but generally it must lead to disastrous results. I regard these first molars as fixed bases in the dental arch, and that the position of the other teeth depends much upon them for forcing the teeth and alveolar process outward and forward to the proper line. The effect of the constant habit of extracting these adult molars in a family is arrest of development of the alveolar process, which in time, I think, will cause inherited smallness of the jaws.

The extraction of these teeth sometimes causes another kind of irregularity, which, though not unsightly when the jaw is seen independent of its mate, is sometimes, so far as the utility of the teeth is concerned, more disastrous. I allude not only to the inclining forward of the second molar and an inclining backward of the bicuspids, but of the contraction of the dental arch, so that it not only impairs the antagonism, but destroys it almost entirely. I have seen cases, as probably most of you have, in which the extraction of the upper first molars has caused the remaining teeth to form an arch so small as to occlude inside of the lower arch, leaving no teeth to antagonize except the corners of the extreme posterior molars.*

The space required to correct an irregularity is never so large as that made by the extraction of the two first molars, and seldom is it necessary to have more space than can be obtained by the extraction of one bicuspid on each side. As these latter teeth are generally situated nearer the point of the greatest degree of irregularity, the operation is often facilitated by their extraction. Of course, I do not advocate extraction of bicuspids or any other teeth in all cases of overcrowding, but when it is necessary to extract side teeth at all, I prefer, as suggested by one authority, to extract a sound bicuspid rather than a first adult molar, even though the latter should be considerably decayed.

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*Some of the bad results of extracting these teeth are well shown in a recent paper by Dr. Davenport in the DENTAL COSMOS.

In a paper upon the subject of "The Differentiation of Anterior Protrusions of the Upper Maxilla and Teeth," read before the last International Medical Congress, I explained how the different varieties of protruding teeth were caused, and remarked that if these lesions are thoroughly understood by the operator, it will enable him to correct them easier than if he does not understand them. For illustration, protrusions caused by arrest of development, or those from socket disease, are easier to reduce than those protrusions caused by deposition of bone-cells,—such, for instance, as are illustrated in Dr. Kingsley's work, page 131.* In the first-mentioned varieties we have simply normal alveolar process to resorb by the application of pressure upon the teeth. But in a patient twelve years of age, with the lower incisors antagonizing with the gums in the anterior part of the vault of the mouth, the result of long teeth or of excessive height of the alveolar ridge, the upper incisors protrude between the lips at an angle of 45°. We have an alveolar process as dense and hard as true bone, and the pressure required to move the teeth must be several times greater,—often greater than can be obtained from any anchorage that can be made in the mouth.

APPARATUS.

Special plans of treatment have been advanced by dentists, and special kinds of apparatus have been invented and put forward in the market for general use, but it is rare to find one of these that will serve for more than one case, even though it be of the same class, without considerable alteration or without being all made over. Many practitioners of dentistry have been misled by advertisements of these goods. They read well, but they are a delusion and a snare. I think that those devices which are recommended for reducing anterior deformities caused by arrest of development of the maxillæ should be used with caution, or else the incisors and cuspids, instead of being moved backward, will stand still, and the anchor teeth (the bicuspids and molars) move forward. One author,† however, in his work, shows to what extent the side teeth are useful for anchorage, and also points out when to resort to the head-gear. In my hands the only satisfactory appliance in all cases is the skull-cap of Fox, making the back of the head the anchorage.

The degree of difficulty in such cases depends somewhat upon the shape and thickness of the alveolar process, height of vault, and the age of the patient.

It may be claimed that the devices on the market are only approximate in form; that the operator is expected to make alterations before putting them into use. But often it would require more skill to alter such ready-made mechanisms than it would to invent and construct new ones. No matter how well he may understand the cause of a deformity and the device which is necessary to correct the case, unless he knows how to construct apparatus so that it will meet the needs of each case, he will be liable to fail as a regulator. Frequently dentists send me models and ask for opinions as to the best plan of correcting the cases. They often also call for the mechanism for correcting them. My plan of reply is to return the models and refer the senders to certain well-known forms of apparatus, naming them in the order in which they should be considered. If one will not meet the demands of the case, another can be studied. I purposely refrain from speaking upon any special plans of treatment, unless I can have the opportunity to personally study the mouth and face.

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* "Oral Deformities." These cases are also referred to in my work, page 161.

† J. N. Farrar.

During the past ten years special devices have been urged, through private and public clinics, upon the profession by different operators, as special "systems" of practice. As a proof of the value of their "systems," they show cases in plaster which at first glance appear to show favorable results, but to an expert many of them show unfavorable results. The profession has but to examine the illustrations in some of our monthly journals to find such failures. Some of these things have even been patented, not for protection of the profession, but for making money out of dentists. If these things, some of which are old to the profession, were practicable when bought, there would be some redeeming feature in the business. I have tried all that are on the market, with one exception, and I have not yet found one case for which I could not devise something different that would accomplish the work more easily and with better results. The exception referred to is a device that would be worthless for any case. Show me a dentist who tries to regulate all cases with one piece of apparatus, or one set of them, and I will show you an unsuccessful practitioner. Do not misunderstand me. Most mechanisms made for sale may have accomplished the desired results in the cases for which they were devised, but the assertion that they will meet the needs of all similar cases I think is unsound. I believe that everyone who has had experience with them will say that "they have been tried and found wanting." Many operators, including myself, who have been deluded by these advertisements, have sometimes not only been disappointed in the thing itself, but have been drawn into embarrassing positions with patients.

I have already alluded to such a case in the treatment of anterior protrusions, when the posterior teeth have been carried forward instead of the anterior teeth being carried backward.

The treatment for correction of irregularities should be like that of true medicine. It should not restrict itself to any one thing or any one plan, but selected from all things and from all plans that have proven efficient. It may, of course, require sound judgment to select that which is the best for a case, but that does not prove anything unsound in my remark.

Every operator in this branch of dentistry should have large resources at his command from which to select the best materials for regulating mechanisms for any given case, because there is no panacea.

To Dr. Norman W. Kingsley, in 1880, is due the credit of introducing several effective devices, and credit for bringing together in a section of his valuable work (principally devoted to other subjects) much of that which was then known upon the subject of irregularities. Since the issue of this book another work on the science and art of the treatment of irregularities of the teeth has been published, by a different author. This reflects great honor upon the dental profession, not only by the vastness of the work, but because the author has handled the various phases of the different subjects in a highly scientific way and in a catholic spirit. The volume is so well systematized that any dentist referring to it can find information on almost every conceivable point, and also find illustrated almost every valuable mechanism that has ever been used for the correction of any kind of a case or class of cases. At the risk of being regarded as enthusiastic, I will say that this encyclopædia—for that is what it really is—will always stand out in bold relief as one of the few grandest blossoms of the dental profession, and as a product developed in our generation we should be proud of it. To say in Dr. Kingsley's words that Dr. Farrar's book "is the most elaborate and exhaustive work of its kind," is not too great an encomium.

At the present day I think that dentists should discard clumsy plates whenever it is possible, and I think it probable that in the near future, as has been demonstrated in the past fifteen years by some of the ablest specialists in this branch, nearly all irregularities, including the most difficult forms, will be treated with skeleton mechanisms consisting of clamp-bands, ferrules, levers, gold ribbons, gold and steel screws, and rubber and wire springs. Plates, however, have their uses, and are sometimes absolutely necessary to success, but when plates are called for they should be as light and small as possible consistent with effectiveness.

From the time that the first treatments for correction of teeth were reported by different dentists, up to about the year 1876, all or nearly all mechanisms consisted of plates and narrow strips of sheet gold, or silver, placed along the dental arch, and the teeth were connected with them by strings or rubber rings. The plates as then made were cumbersome, filthy, and the strings tied on the teeth cut deeply into the gums, causing irritation, inflammation, and pain.

To Dr. W. H. Dwinelle, of New York city, is due the credit of making in 1849 one of the greatest advancements in the treatment of widening the dental arch,—the use of the screw-jack. This was made of steel. It remained for Dr. Farrar, however, to substitute steel screw-jacks by gold screw-jacks, and to make and develop numerous plans for using screws in other ways as aids in causing continued as well as intermittent force, with the least harm possible to the tissues. In 1866 the introduction of steel piano-wire in combination with plates, invented by P. Headridge, of England, and two years later developed by the elder Coffin and his son, was another stride in advance over earlier plans of using springs; but in Dr. Farrar's combination of springs with screw-clamp bands for anchors we have devices that are superior.

Wire, from its elasticity and quality, enabling it to be bent in any desired form, is available for use in many conditions of irregularities not before thought possible by anything. The use of clamp bands does away with clumsy plate anchors. For the best interests of patients of nearly or quite full growth, I have become convinced that when it is practicable to apply intermittent acting apparatus, it is by far the best. But there are many cases for which screws are not practicable, and wire springs and elastic rubber are better, and, strange as it may seem to some of you, for more than a hundred of this class of devices we are indebted to Dr. Farrar's ingenuity.

A very simple little device which I use constantly, and by which I reduce many abnormalities, is made of German silver rolled (Nos. 24–26 and 28, U. S. gauge) and cut into strips, and then bent in and out between the teeth ; the ends being shortened every day. This device can be used between any of the teeth, including the bicuspids and molars.

Considerable was said years ago about "jumping the bite," as it is called, and a number of articles have appeared this past winter in the dental journals in which this subject has been revived. As I understand this phrase, it consists in throwing the lower jaw forward one-half the width of a bicuspid, thus bringing the lower incisor closer to the posterior surfaces of the upper incisors, and also causing the chin to become more prominent. In a case like this, one of two conditions exists : either the upper jaw has developed beyond its normal position, or the lower jaw is arrested in its development. The latter is most likely the case in a large majority of cases. In either case the articulation at the joint is in a normal condition. I have never been able to "jump the bite," although I have tried it in a number of cases. I do not believe anyone else has been able to accomplish it, nor do I believe that such a thing is possible. Were such a thing possible, one of two things must take place. First, absorption and deposition of bone-cells must take place at the weakest part of the jaw,—namely, at the angle,—to allow of the forward movement, which is out of the question, for two reasons : First, there is not pressure enough ; and second, if it could take place, the articulation of the teeth would be spoiled. Second, there must be a forward movement by absorption of the condyle in the glenoid cavity of the same amount of space to correspond to the forward movement of the teeth, which is out of the question for three reasons : First, there is not pressure enough to produce the absorption ; second, tissue in front of the cavity would become involved ; and third, nature would not construct a new cavity to accommodate the condyle.

FEES.

No one thing has had a tendency to degrade this branch more than the plan of making fees for the operations. It is the custom with some dentists to examine a case and then make an estimate upon the operation, just as a carpenter estimates the cost of making a door or a window. In the latter case the carpenter knows what he is figuring upon, and therefore is sure to make a profit by his contract. On the other hand, the dentist may not be able to forejudge in regard to the extent of work necessary to complete an operation (because he has no means by which he may calculate upon the idiosyncrasies of his patients), therefore a set fee is an uncertain remuneration. If he values his time on the same basis as for other operations, the results are often too small. Frequently the operator is satisfied with small compensation, arguing that his time would not be otherwise used. This argument, of course, applies only to those who have a limited practice. A large proportion of dentists practice their calling as if it were a trade, rather than as a profession. In no other department of surgery would the operator be satisfied with the fee for the time spent, as does the average dentist on regulating cases.

The method of a prominent Boston dentist is as follows: After taking the impression, a time is set for the next visit. This gives the operator an opportunity to study the case, as well as to inform himself of the responsibility of the patient. When the patient returns, a contract is agreed upon, and the basis is, say, one, two, or three dollars per visit, and one, two, five, or ten dollars for each device used, the price being governed partly by the nature of the appliance to be made. The operator should never commit himself as to the nature of the devices to be used or to the length of time required for completion of the operation, for it may be necessary to change the device or plans of procedure two or three times before he is able to accomplish the desired results, or the operation may take more time than he at first supposed. By this plan patients and relatives are not disappointed, nor do they lose confidence in the ability of the operator.

In this way people of limited means are not deprived of the best services, and the rich are charged no more than the poor. By this plan the dentist is better satisfied for services rendered than he usually is.

THE GRINDING-TEETH OF THE HERBIVOROUS MAMMALIA.

BY ALTON H. THOMPSON, D.D.S., TOPEKA, KANSAS.

(Read before the American Dental Association, Niagara Falls, N. Y , August, 1892.)

THE molars of the herbivorous mammalia present an interesting and remarkable example of a high degree of specialization. The complex structure of the masticating surface of these teeth is produced by an arrangement of the dental tissues in alternating layers, the different densities of the enamel, dentine, and cementum allowing of different degrees of wearing away, so that an irregular surface is constantly presented for the purpose of triturating resisting vegetable fiber, which is such an important function in the physiological economy of the vegetable-feeders. In use, the enamel, being hardest, stands highest; the dentine, being less dense, stands lower; and the cementum, being softest, stands lowest of all. As Owen says ("Odontography"), "The most complex and varied systems of dentition are found in the great natural group of the hoofed quadrupeds. The molar teeth are of a complex structure, produced by an interblending of the dental tissues of the crowns, producing that noticeable efficiency for mastication. Various patterns result from the variety and arrangement of these tissues." The molars in the Ruminants and all vegetable-feeders are formed as though layers of enamel, dentine, and cementum had been laid upon one another and the whole then rolled and crushed together. This produces a very effective instrument for mastication, and is a highly specialized form of tooth, as we shall notice later.

A cross-section of the tooth reveals a pattern which presents great variety in different species, and is of distinct diagnostic value. This pattern differs in different families and orders, but is uniform in a species, and is closely related in each genus. By the study of this pattern, naturalists have a means of diagnosing species, and it is of great value to the paleontologist in the classification of the remains of extinct animals. The teeth are the most durable of the animal tissues, and form the most constant medium for the identification of fossil remains. In the evolutionary history of the horse, which was so beautifully worked out by our brilliant paleontologists, the testimony of the teeth was necessary for the confirmation of the descent of the species. It is satisfactorily proven that the single-toed horse of to-day is descended from five- and three- and two-toed ancestors who have all the characteristics of the horse, even to the molar pattern. So the biological history of other groups has been worked out with more or less certainty, and the teeth have performed an important part in the evidence they have furnished. And in the vegetable-feeders the characteristic patterns of the molars have been reliable indications of affinities, on account of their uniformity. As Owen again says, "Different groups of the Ungulata, not only orders and genus, but even species, are characterized by the various patterns which result from the various forms, directions, and proportions in which enamel and cement alternate with dentine in the substance of the crowns of the complex molars."

The most highly specialized group is that of the Ruminants, of which Owen says, "In the Ruminants the characteristic complexity of the molar teeth is manifested even in the deciduous series, but in the permanent series only by the three posterior teeth of both upper and lower jaws, which are the true molars. The complexity is the result of peculiar folds of the formative capsule, some of which are longitudinal or project inward from the sides of the capsule and form peninsular folds of enamel upon the grinding-surface of the tooth, while others depend vertically from the summit of the matrix into the body of the tooth, and form islands of enamel when the crown begins to be worn. Of the longitudinal folds, two, in the upper true molars, are external, broad but shallow and often sinuous, and one is internal, narrow and deep, and extending quite down the summit of the crown and decreasing in depth toward the depth of the crown; the corresponding folds of enamel in the completed tooth accordingly extend more or less across the tooth, from within outward, as the tooth is more or less worn. The crown of the tooth is thus divided into two lobes, placed one in front of the other, the inner side of each lobe being convex, the outer concave in a less degree, and usually sinuous or with a convex prominence in the middle. The vertical folds of the capsule, two in number, extend one into each lobe, and in the upper molars are concave toward the outer and convex toward the inner side of the lobe, which is thus divided into semi-cylindrical lobules, with crescentic summits, as seen on a transverse section or on the grinding-surface of the tooth, each lobule consisting of a middle bay of dentine and an outer coat of enamel and thin cement. The mid-space between the lobules, the center of the vertical folds, is filled with cement, and commonly contains portions of vegetable fiber; it is inclosed by a crescentic island of cement, and the whole of the circumference of this complex molar is also invested by a coat of enamel, and this by a layer of cement. Different genera of the Ruminants also differ in the depths and sinuosity of the two outer longitudinal folds, and in the depth and complexity of the two vertical folds, which likewise are united in some species by a longer column than in the others.

"In the family of the Sheep and Goats the two outer depressions are broad and shallow, with a very low middle convexity, and are bounded by well-defined, narrow, prominent longitudinal ridges, the posterior or third ridge being less developed than the other two, and there is no internal accessory column. The Goats offer a rudiment of a secondary fold at the extremity of the insular canals, which is rarely seen in the Sheep.

"The Antelopes have the medium convexity of the two outer shallow depressions of the upper molars more marked than in the Ox, and the crescentic enamel-folds are wider.

"In the Ox, the outer border of each lobe of the upper molars is more sinuous than in the Antelope or Sheep, the middle convexity being more prominent and the lateral depressions deeper. The crescentic islands are not so wide as in the Antelope, and the ends less marked.

"In the Deer the inner crescentic subdivision of each lobe is thicker transversely than in the Bovidæ, and in the extinct species of the genus (as the great Irish Deer), the large molar teeth, the crescentic islands are more horned and more simple than in the Ox. There is a later division of the vertical fold of the capsule, and the cavity is continued till a later period of attrition.

"In the Elk the lateral crescents are continuous for a still longer period, the medium transverse fold extending its full length for a greater extent, and the crown continues to be divided during a longer period by a crucial incision.

"In the Giraffe the medium convexity of the outer surface of the anterior lobe is more prominent than the anterior border of the convexity from which it rises, while the anterior border of the posterior lobe is more produced than the middle prominence. The crescentic enamel-folds are continued into each other until the tooth is worn low down.

"The teeth of the Camel present the most simple condition of the ruminant type of these teeth, the transverse fold dividing the column being short, and the dentine of the two lobes form a continuous tract. The base of the crescentic folds of the capsule being likewise short, the enamel islands are now separated from each other, and the longitudinal depressions of the crown have no middle rising, and there is no column at the interspace." In other words, as we would say nowadays when the evolution theory accounts for tooth-form, the lesser complexity of type of the Camelidæ shows that it is a survival of a primitive form, and the greater complexity of the molar teeth of the Deer, for instance, means that that type is a later outgrowth; the evolution of tooth-forms, like everything else in organic nature, proceeding from the simple to the complex, excepting always the cases where there is evident retrogression.

"Cuvier compares the lower molars of the Ruminants to the upper ones reversed. In the lower true molar the simple medium longitudinal fold is external, and divides the convex outer side of the two lobes. The base of the fold extends in some species across the crown for some depth. The inner surface of the molar is generally sinuous, the concavities being rarely so deep as those of the upper molars. The lower molars are always thinner, in proportion to their length, than those above, and the crescentic islands are narrower and less marked. The last true molar of the lower jaw is characterized in the Ruminants by the addition of a third posterior lobe. This is small and simple in the simpler teeth, as in the camel, and larger and more complex in the Bovidæ and the Cervidæ, which have more complex teeth.

"In the Hog (*Sus*) the molars progressively increase in size from front to last. The crown is simple. The first true molar primarily shows three cones, with smaller subdivisions, formed by the wrinkled enamel and an anterior and posterior ridge. The great extent of the last molar is chiefly produced by the development of the back ridge into a cluster of tubercles. The lower molars are similar to those above, but rather narrower. The transverse depression on the lower first and second true molars is deeper than in the uppers. When worn down somewhat, the enamel coats of the three lobes form three islands arranged in a triangle. Many variations of greater or less importance are found in the living and extinct species of *Sus* and related genera.

"In the Hippopotamus the true molars are primarily divided into two lobes or cones by a wide transverse valley, and each lobe is subdivided by a narrow antero-posterior cleft into two half-cones. A strong ridge bounds the base of the crown. When the crown wears down somewhat, each lobe presents a double trefoil of enamel on the grinding-surface, and when much worn each lobe presents a quadrilobate figure. The last molar has a fifth cusp." The extinct Hippopotami follow the type of the living species, and the remains are readily recognized.

"In *Equus* the molar teeth present an intermediate pattern between the Ruminants and some extinct forms. The crown is cubical, has a valley penetrating obliquely from behind forward across the face, crossed by two crescentic valleys, which soon become insulated, as in the Camel." The molars of the horse thus approach a lower, simpler form, and are not so complicated as in the Ruminants. "The large internal lobe is like the extinct forms. The horse's teeth bear a close analogy to those of the rhinoceros. In the lower jaw the teeth, as in other Herbivora, are narrower than the upper molars. They are divided externally into two convex lobes, and on the inner side present three unequal convex ridges.

"In the Rhinoceros the molars are sub-cubate, and the grinding-surface, when moderately worn, is penetrated by two folds of enamel and a valley. The principal valley extends obliquely from the inside outward and forward about two-thirds across, where it terminates, according to the species, in a cul-de-sac. The second and smaller valley is usually of triangular form, and indents more or less deeply the posterior border of the crown. In some species this is wanting in the last molar, which has a trihedral crown. In the lower jaw the molars have a narrow crown, divided into two crescentic lobes placed obliquely." The Rhinoceros molar is readily recognized in fossil forms, and is simpler and less complicated than in the Horse.

In the Proboscidians we have an interesting group. Beginning with the Mastodon, we find that this extinct pachyderm "had molars whose grinding-surface was divided into wedge-shaped, transverse ridges, and the summits of these were subdivided into smaller cones of teat-like shape. The molars above had three bifid transverse eminences, and a tuberculate ridge along the front, back, and outer part of the base. In the last molar the basal ridge is usually more developed. The fourth molar had four transverse, bifid ridges, and a posterior talon."

The Elephants are the only living examples of the great Proboscidians, of which a great variety have lived upon the earth in past geological days, as evidenced by their fossil remains. Their "molar teeth are remarkable for their great size, even for the size of the animal, and also for the extreme complexity of their structure." The earlier forms are simpler, and the later and last are more complicated. "The crown is deeply divided into a number of transverse perpendicular plates, each consisting of a body of dentine covered by a layer of enamel, and this by a less dense bone-like substance which fills the inner spaces of the plates and binds them together before they are fully formed and united by confluence of their bases into a common body of dentine. The growth of each plate is analogous to that of an entire tooth, for it is as complex. These plates are formed and then blended together to form the continuous crown." When the molar is worn, the pattern of the ends of the enamel-plates presents variations in different species of Elephants, both living and extinct. For instance, the two living species, the Asiatic and Indian Elephants, differ perceptibly ; in the one the end of the plate is a long oval in shape, and in the other is more diamond-shaped and wrinkled. "The molar teeth progressively increase in size from before backward, and succeed each other from behind forward, the worn-out teeth dropping out of the groove in front. The last molar is largest and appears late in life. It often contains twenty to twenty-five plates."

Some of the Rodents have a somewhat complicated structure of the molars, but the order is so vast that we can only describe them in general. At first they are only simple tuberculate molars, and when the summits are worn off present a simple pattern of alternating valleys and ridges of enamel and cementum ; but as age progresses the grinding-surface is reduced to a smooth field of dentine bordered by enamel, as in man. The folds have a general tendency to a transverse direction across the crown of the tooth, a shape accommodated to the modification of the joint of the lower jaw, which allows of backward and forward movement during mastication. There is not much variation from the transverse type of ridges in this order. There is a difference between the rootless molar of continuous growth and those of limited growth which have roots. As the habits vary, the teeth vary in different species. Some approach the Ruminant type, and others again are more like the elephant in the form of the transverse plates.

The origin and evolution of the teeth of the plant-eaters is a most interesting study. Being highly specialized, they have arrived at a high degree of perfection by gradual steps, most of which can be traced in the successive steps furnished by both living and extinct forms. As Professor E. D. Cope says ("Origin of the Types of the Molar Teeth," etc.), "The simple tubercle may be regarded as the least specialized form of tooth, and the transition from simple to complex teeth is accomplished by repetition of the type of the simple tooth in different directions. Complex teeth, as the tubercular molars, merely exhibit additional lateral tubercles, and sometimes additional longitudinal ones. The form is complicated in two ways: *i.e.*, either by the folding of the sides, or by the development of tubercles on the crown. Upon this basis are constructed the more complex types of teeth exhibited by the various families of the Ungulata and some Rodentia. The crowns of the superior molar teeth of the higher mammalia are supported on three roots, two of which are external and the third internal. The corresponding inferior molars are supported on two roots, and are less complex. But these two roots usually support four tubercles, two on each side, while the roots of the superior molars support directly but one each. The crown of the inferior molar is therefore more complex than that of the upper.'' He divides the different kinds of molars into special classes, as follows: 1st, The haplodont, in which the crown is undivided and simple: low and obtuse as in the Cetacea, or raised and acute as in the Carnivora. 2d, The ptychodont type, the crown folded upon the sides, the folds frequently crossing the crown, as in the Rodentia. 3d, The bunodont type, the crown supporting tubercles, which are few and opposite or alternating, and may be many and irregular. To this class belong the Mastodon, Man, the Bears, the Carnivora, and some Rodentia. 4th, The lophodont type, the summit of the crown thrown into folds of transverse or longitudinal direction, as in the higher ungulates. It embraces the many types of ungulates, some Rodentia, and others. ''The transition between the bunodonts, or tubercular teeth, and the lophodonts, or folded teeth, is very obvious, so as to lead to the belief that the several subdivisions of the lophodonts represent modifications of corresponding types of bunodonts. Intermediate forms are seen where the tubercles of the mandibular teeth are compressed, while they remain conic. Thus the teeth of the Hippopotamus, whose molars present four principal tubercles, are truly bunodont; the valleys separating the tubercles are deeper than the truly bunodont genera, but much shallower than those of the true lophodonts. In the latter the valleys are deepened and the tubercles are more compressed and elevated, as in the Deer. In the ancient species of Deer the crests are lower and the valleys shallower than in the living species. The lophodont molar was produced by modification of the bunodont, and the manner of the change has been by constant acceleration of the growth of the folds of the crowns upward, and perhaps downward, in its long axis, and acceleration of the length of the crown.'' Or again he says (''The Extinct Mammalia''), ''The ordinary tooth of the higher type of the mammalia, whether hoofed or not, with some exceptions, is complex with crests or cusps. By cutting the complex grinding-surfaces we find that they have been derived by the infolding of extensions of four original cusps or tubercles. They have been flattened, have been rendered oblique, have run together, have folded up, have become acute, have descended deeply, or have lifted themselves, so that we have teeth of various kinds, sometimes very elegant and ofttimes very effective in mechanism. In many primary ungulates the primitive condition of four conical tubercles is found, and in passing to older periods we find the mammalia of the

Puerco period, which rarely have more than three principal tubercles. In the succeeding periods, however, they get the fourth tubercle, and then others, and finally a complicated grinding or cutting apparatus.''

Extensive study has convinced the naturalists and evolutionists ot our day that the Lamarckian theory of use and disuse, or, as it is latterly called, the mechanical effects of use, have had the principal influence in the development of tooth-forms. Dr. John Ryder, in his article ''On the Mechanical Genesis of Tooth-Forms'' (*Proc. Academy Nat. Sci.*, Phila., 1878), has elaborated and described this fully, and shown how the theory accounts most beautifully for the origin and formation of many forms of teeth, and especially of the class we are now studying. He says, ''Among the Ungulata the most conclusive evidence is found of dental modification. The numerous living and extinct forms present a remarkable chain of dental forms gradually developing from the bunodont type and passing into the exclusively modified selenodont type, acquired by increasing mobility of the mandible. In Elephas and Mastodon the jaw-movement is from behind forward. The molars are tuberculate in crown-crests, which become obsolete from wear, and expose the transverse plates.'' The antero-posterior movement has developed the form which offers the greatest resistance to this movement in mastication and consequent efficiency in reducing food. The primitive form of jaw-movement is that of simple opening and closing, as in the typical Carnivora. Next came the backward and forward movement, as in the Proboscidea and other primitive types, and then the lateral movements of the jaw, and finally the extensive triangular excursions of the jaw of the Ruminants and other vegetable-feeders as the highest of all. ''The opening and closing movement is most characteristic of Dogs, Cats, Pigs, Hippopotami, Bats, Opossums, and all other bunodonts or their immediate allies. The Pigs show the first tendency to lateral movements, and have lengthened crests to oppose this movement of masticating. The Tapir presents still more lateral movement, and the Kangaroo still more. The Rhinoceros describes a much larger excursion, and the Ruminants the largest of all. In these the lateral is quite extensive, if not more so than the longitudinal movement. In all these forms there is, of course, corresponding modification of the condyle and the glenoid cavity to permit of the typical movement. Indeed, the development of the peculiar movement of each class has modified the articulation, as it has the teeth. The forms of teeth result from the strains incident to mastication. Thus, in Lepus the strain is upon the inner side of the upper molar and on the outer surface of the lower molar. This leads to a peculiar straining and curving of the teeth, and a corresponding arrangement of the dental tissues, ''the recurved enamel pattern of the opposing molar series simulating most closely some of the mechanical devices used by man in grinding-mills.''

In *Cervus* the idea of ''displacement due to strain'' is shown most remarkably. There is some evidence that the premolars are acted upon from the external side as well as from the internal, which tends to keep the jaw narrowed at that point. The true molars are, however, acted upon from the inside on the upper and the outside on the lower jaw. This tends to spread the jaw at those points and modify the enamel pattern. The motion being lateral, the straining, both on tooth and tissues, must be very powerful. In the Giraffe the molar line of the lower series is slightly convex internally, and it has extensive lateral excursion of the mandible. The upper series is convex externally. The displacement seems to be greatest where the masticating muscles act with greatest force. In the Rodents there is a reciprocating motion which counteracts the lateral, so that displacement is not very great. In Cervus there are deep transverse valleys and cross-crests, showing the persistence of this arrangement where the mandibular movement is entirely lateral.

"It looks as though the strains incident to mastication had pressed the cusps of the tooth flat and curved their cornus outward in the upper series and inward in the lower, by their oft-repeated excursions in one direction. The flexures are modified in accordance with the various directions of the excursion forces, and the plicate layers of the dentition of the horse, and perhaps of the ox and deer, may be accounted for in the same way. The plication is greatest in a line parallel with the direction of the strain executed during mastication. Another circumstance is the greater inclination of the inner cusps of the upper molars outward and of the outer ones below inward, which is so common among selenodont ungulates.

"The mandibular apparatus of mammals may be regarded as a lever of the third class, in which the glenoid cavity is the fulcrum, the muscular force the power, and the resistance of food to the teeth in crushing is the weight. Since the coefficient of muscular force is one hundred and four pounds to the square inch of transverse section, it is easy to surmise what would be the tendency of the force of mastication. It is not all expended in reducing food, but must react upon the structures which are subjected to the strain."

But we cannot follow this interesting subject further. Enough has been given to show the origin and the method of evolution of the remarkable and complicated structures of the molars of the herbivorous mammals. The great influence dictating this unique formation is food-selection, which is so powerful in modifying the masticating apparatus of animals. In no field is the study of tooth-formation and its evolution more interesting than in that of this class, on account of the highly specialized forms that have been developed in obedience to a demand for a more effective apparatus for the reduction of refractory foods.

THE COHESIVE PROPERTY OF GOLD: ITS CHARACTER, VALUE, AND AVAILABILITY.

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(Read before the Joint Union Meeting of the Pennsylvania and New Jersey State Dental Societies, July 21, 1892.)

GOLD is one of a small group of metals which from the earliest days of metallurgic science, or even of alchemy (which was unscientific experiment), have been designated "noble" metals. They received this appellation from the fact that while they united more or less freely with other metals they were very slow to combine with non-metallic substances, and hence were always found native or in a metallic state. But while thus found, gold at least is never found pure. Its most common associate is silver, although other metals, such as tellurium, bismuth, lead, etc., are often found in combination with it in minute quantities.

In this is constituted the difference between native gold and virgin gold; the former is always more or less alloyed as found, while the latter is gold that has been made pure by chemical action.

Gold, while possessing most of the physical characteristics common to metals, possesses certain ones in a very marked degree. Among these may be mentioned especially malleability and ductility. In the former it stands preëminent, while in the latter it is excelled by but one or two metals. Its possession of these two properties in so great a degree renders it useful above all other metals for dental manipulation, while its further property of insolubility in any of the pure acids, whether vegetable or mineral, makes it especially suitable to be placed in the human mouth.

Another property which it possesses to a remarkable extent is softness, although this is implied by the previously mentioned properties, for no metal could be malleable and ductile to the extent that gold is without being exceedingly soft.

Lead is softer than gold in that it retains its softness under continued beating, while gold, similarly treated, becomes stiff and hard; but gold is far more ductile than lead.

Malleability and ductility are in all cases due to and dependent upon cohesion, which may be defined as that force which binds and holds together the ultimate constituents or particles of any solid.

Gold in its pure state possesses this property to such an extent that two masses of it under suitable conditions may be as perfectly united in their cold state as they could be if fused by the aid of heat.

If two sheets of pure gold of moderate thickness, with perfectly clean surfaces, be laid one upon the other and passed between the rolls of a rolling-mill, they will become so thoroughly united that no amount of force can separate them. The same result will take place between a sheet of pure gold and one of pure platinum under the same conditions. It is in this way that the crown-metal so largely used to-day in the construction of crown- and bridge-work is produced.

So, too, in the process known as fiber-plating, for the production of filaments from which gold lace is woven, a rod of silver is gilded by simply burnishing leaves of pure gold upon it. It is then drawn into wire so fine that a length of it extending a mile and a quarter will weigh but one ounce.

How is this perfect union brought about? Either one of two theories will account for it. One, the molecular theory, holds that while the attraction of cohesion operates upon all solid bodies, its operation is only sensible at insensible distances. When, therefore, the molecules of the same body, or of two similar bodies, are brought within the sphere of this attraction, cohesion takes place.

The other, which for want of a better name we may call the dynamic theory, holds that the molecules of a mass or masses of matter are held together by being interlocked with one another, either naturally or by being compelled to assume such a relation under the influence of pressure.

It would seem as though, in the instances cited, both the molecular and dynamic forces operated to produce the result, for union between the metals will not take place unless they are brought into the closest possible apposition, nor will it result if the metals have been hammered or rolled and not subsequently annealed. When a nugget or ingot of gold is subjected to pressure its bulk is sensibly reduced, but when heated to a point slightly below fusion its original dimensions are restored.

This latter process is known as annealing. So, also, when a mass of gold is beaten or rolled it assumes a condition of stiffness and intractability, but its original softness and plasticity are completely restored by annealing. These changes in the mass are explained by the universally conceded fact, that under the influence of pressure the molecules are driven into closer proximity than is natural to them, and that heat, by expanding the mass, allows the particles to move slightly among themselves, and resume, as nearly as may be, their former relations to one another.

Gold, after being beaten into foil, is always annealed in order to restore to it the softness which has been lost in the process of hammering. It also restores its cohesiveness. When it is desired to modify this cohesiveness the foil is simply exposed to the air for a time, and thus converted into the quality known to us as semi-cohesive. During such exposure the gold probably attracts and attaches to itself minute particles of matter, which are always found floating in the air. It is also probable that there is a condensation upon its surface of certain adventitious gases and vapors. In this way the surface becomes coated with a layer of foreign substances which modifies, and would in time entirely destroy, its natural property of cohesion.

Some manufacturers of gold foil have a method of rendering it non-cohesive without exposure, and claim that, while in this condition it is as pure as the cohesive, it cannot, like other preparations of foil, be made cohesive by annealing.

The process of imparting this property to pure gold is kept a secret by the few who understand it. Truly non-cohesive gold possesses the quality of softness or pliability in a remarkable degree. This it could not have without the final annealing after beating, which, in restoring the softness, would also reëstablish its cohesiveness. It is therefore reasonable to suppose that it is again deprived of its cohesiveness by some subsequent treatment that causes its surface to be overlaid with a film of such character as not to be readily dispelled or driven off by heat. Treating it with a solution of ferrous sulphate, or exposing it to the vapors of sulphur or phosphorus, would probably produce this result, but just what process is employed we cannot say. That the treatment employed in rendering foil non-cohesive is surface treatment is shown by the fact that when two superimposed sheets of this gold are cut through with a shears, the newly-cut edges unite much in the same manner as cohesive gold.

The writer has seen a cavity filled with non-cohesive gold by pricking it in with two cambric needles set in wooden handles. The filling when completed was dense, and the layers of foil were so well united that they could not be separated. While nominally a non-cohesive filling, the layers were really held together by pure cohesion at the point where they were pricked, for the needle, in penetrating two or more layers at a time, exposed the central cohesive portion of the layers at the point of puncture, and brought them into direct contact, resulting in union. Further evidence that non-cohesive foil has had its peculiar property imparted to it by contamination with other metallic substances is furnished by melting in the flame of an alcohol lamp a rope of cohesive and one of non-cohesive foil. The globule resulting from the cohesive foil will be bright and clean, while that from the non-cohesive will be tarnished or oxidized, clearly showing the presence of extraneous matter.

I have here in small vials globules of gold obtained by melting ropes of foil in a Bunsen flame, and catching the globules upon a glass slab as they fell. It will be noticed that those labeled non-cohesive are of a decidedly darker or duller color than the others which were obtained from cohesive and semi-cohesive foil of various makes. One vial, marked "X, non-cohesive," contains globules obtained from a so-called non-cohesive gold; but this make of gold, while professedly non-cohesive, is not strictly so, because moderate heat readily imparts to it the cohesive quality. The globules in this case are nearly or quite as free from oxidation as those obtained from cohesive foil, showing little, if any, surface contamination.

Non-cohesive gold has for many years been sold and used under the less distinctive name of soft gold. The latter term, however, is a misnomer, for, as we have stated, all pure gold is soft unless this property has been interfered with by hammering or rolling. No foil can possibly be softer than cohesive foil, but the misuse of the term soft has arisen from the fact that in the manipulation of non-cohesive foil the layers will slide over one another without cohering, which seems to emphasize or exaggerate the impression of softness. The absence of this sliding or gliding quality in cohesive foil naturally but improperly suggests the idea of hardness. In large and accessible cavities, where no necessity exists for the sliding of gold upon gold, cohesive foil will be found to be equally as soft and tractable as the non-cohesive variety.

Each kind has its special advantages as well as its definite limitations of usefulness, and harm can only result in the ignorance or violation of the conditions under which each should be used.

The benefit conferred by the discovery of the availability of the cohesive property of gold foil in dental operations can scarcely be overestimated, for while the ravages of caries were checked in a very efficient manner by the use of non-cohesive foil, that higher and nobler fulfillment of our art in the perfect restoration of lost tissue could not have been obtained without the advantage of the cohesive property. By the former method, operations could only be performed in simple cavities, and where compound cavities presented, the chisel and file were called into requisition to reduce them to simple ones. In this way not only were the natural forms of the teeth destroyed, but the amount of masticating surface reduced and much discomfort entailed. With the cohesive property of foil intelligently employed, as it is to-day, all these disadvantages are removed and the liability to recurrence of decay greatly lessened.

The history of the development of cohesive gold filling has been similar to that of many other valuable methods and processes. At first its advantages alone were seen, and not only seen but exaggerated. A quality good in itself was naturally supposed to be good under every and all conditions, and its indiscriminate employment without recognition of its limitations resulted in many failures and brought it into disrepute.

The imperfect method of its manufacture and the unintelligent manner of its employment, due to ignorance of its peculiar properties and inexperience in its use, both combined to bring about the unfortunate results with which its earlier use was attended.

Each year, however, has witnessed improvement in quality as well as better methods and more suitable instruments for its manipulation, so that at the present time there are fewer failures attending its use, and little excuse for those that do occur.

Used with an intelligent recognition of its peculiar properties, and under conditions in harmony with them, it has become one of our most useful servants.

In considering its value and availability, it becomes necessary to notice certain practical points both in regard to its properties and manipulation.

The term cohesive, applied as it usually is in a general way, is not sufficiently distinctive to describe the different grades of this kind of foil in use to-day. As now manufactured, we have the moderately cohesive, better known as semi-cohesive; the regular or ordinary cohesive; and the extra-cohesive, each differing from the others in important particulars. The former, for instance, would not be sufficiently cohesive to be used upon the surface, while the latter would be too intractable to be used anywhere but on the surface or in very large and exposed cavities.

For many years after its introduction cohesive foil was used in its most cohesive condition; in small cavities as well as large, in inaccessible as well as accessible ones, and at the base as well as the surface. Such use was in a large measure misuse, and the many failures that followed led in time to a better understanding of its limitations. Seeing that failure occurred where it only could occur in a cohesive filling, along the line of contact between gold and tooth-substance, especially at the cervical margin, it was suggested, and came to be part of the practice with many, to line some part or all of the walls of the cavity with the more adaptable non-cohesive foil, and restrict the use of the cohesive to the body and surface of the filling. The combination of the two kinds of foil in this way, using each in accordance with its peculiar advantages, resulted in a great improvement in the quality of the work produced.

With but the two kinds of foil, the strictly cohesive and the strictly non-cohesive, to choose between, such combination of the two was most wise, and continues to be considered excellent practice. One difficulty attending the method was that of manipulation, for it required considerable skill to combine the two without disturbing their relative positions; while another was that in those cases where it might become necessary, cohesive gold could not be readily added by the welding process to the non-cohesive.

With the introduction of the semi-cohesive variety an advancement was made, for it possesses the ability to be adapted to any surface as thoroughly and accurately as the non-cohesive, and also to have the quality of cohesiveness imparted to it, when needed, by the application of slight heat. In this way the one variety of gold becomes available for use in place of two varieties.

While the manufacturer to-day produces cohesive foil of a far better quality than he did twenty years ago, it is still defective, as a rule, in that the annealing is carried to too great a degree, thus rendering the foil less tractable than it should be. For this reason the dentist who makes large use of cohesive foil generally prefers to buy that which is only slightly cohesive, and to render it more so, when desired, by annealing it himself at the time of using. Experience has shown that the quality of cohesiveness can be imparted to foil more delicately and with a wider range of degree by the dentist than the manufacturer, for he can vary it according to his needs.

There is a point in the process of annealing, well known to the experienced, which gives to the gold sufficient cohesiveness for all purposes without lessening its adaptability, whereas if carried beyond this point its best qualities are impaired. Careful and proper annealing, therefore, is one of the most important considerations in the manipulation of cohesive foil.

The extent to which annealing may be advantageously carried depends on the thickness of the foil and the manner in which it is to be applied. In the heaviest grades of rolled gold intended to be used upon or near the surface, or, for that matter, where the entire filling is to be made from it in large and very accessible cavities, the gold may be heated to a dull red color, and the greatest degree of cohesion thus imparted to it without interference with its working properties, for it is intended to be laid layer by layer in a comparatively even and regular manner.

With the lighter grades of foil, prepared in the form of twisted ropes or folded ribbons, for use in less exposed cavities and throughout the filling where the same evenness of surface cannot be maintained, so great a degree of annealing would seriously interfere with the proper working of the foil, without conferring any real advantage. It has therefore been found best to give to the lighter foil, which is used throughout the body of an ordinary filling, only a slight degree of cohesiveness, reserving the greater degree for surface work where more perfect cohesion is required. The semi-cohesive variety of foil, which does not unite upon casual contact, but will allow one surface to glide over another without interference, and which only becomes united under pressure, is the kind best adapted for the main portion of all ordinary or medium-sized fillings. When nearing the surface, the same gold slightly annealed will give to the filling that uniformity of texture and density so necessary to usefulness.

As to the manner of annealing foil, various practices prevail; some passing the foil through or near the naked flame, while others, preferring not to expose the gold thus to the products of combustion, heat it upon a tray of metal or mica held over the flame. The latter would seem to be the better way of avoiding over-heating, but experience shows that equally good results follow the use of the former method, provided proper care be taken. To avoid over-heating by this method with the lighter grade of foils, as well as to attain the proper degree of cohesiveness without harshness, the gold should never come in direct contact with the flame, but be passed quickly just above it. There seems to be no preference between the use ot alcohol or illuminating gas for annealing, provided the latter is used in connection with a Bunsen burner, affording perfect combustion.

One interesting fact remains to be mentioned in connection with the subject of annealing. For years it has been generally claimed and believed that the so-called strictly non-cohesive variety of gold could not be rendered cohesive by annealing, but the writer has recently satisfied himself by experiment of the fallacy of the idea. Annealing it in an alcohol flame of moderate size does not materially change its quality of non-cohesiveness, but when heated to redness in the larger flame of a Bunsen burner its condition becomes so greatly changed that it can be as readily and perfectly welded as cohesive gold. Treated in this way, however, it differs from the ordinary cohesive gold in the fact that pieces coming into slight contact do not cohere, and that mallet-force in some form is necessary to bring about the desired union.

Another very important feature to be considered is that of the form and character of the points used in the condensation of cohesive foil. If gold is torn or lacerated in the course of introduction, additional labor and time will have to be expended in again bringing the severed portions into absolute union. It is therefore the part of wisdom to avoid such severance. This can only be done by using points with the finest and most delicate serrations upon their surface, and that are free from any sharp angles. In addition to this, the face of the instrument should be of such size as to cover considerable surface, and thus avoid piercing the different layers. As we have already shown, cohesion takes place most readily and perfectly when the surfaces of the different layers are brought into absolute contact at all points. This is best accomplished by keeping the surface of the filling as nearly uniformly even as possible, and broad-faced instruments should be used for this purpose.

Instrument-points with just sufficient convexity to avoid flatness, and with distinctly rounded edges, will produce better results than any others in welding gold.

Fine serrations, while they are unobjectionable and produce good results in connection with slow malleting, where rapid malleting can be employed, as with the mechanical or electric mallet, even more perfect results are obtained by the use of smooth points, or those with but the faintest trace of roughness upon them. Points of this character, of as large size as can be conveniently employed, used in connection with cohesive gold of any form, will produce a filling so compact and homogeneous that it will never scale or pit, but always preserve the perfect surface given to it at the time of finishing. A filling of this character will have not only the appearance but the essential qualities of a mass of cast gold.

The pitting and scaling of cohesive-foil fillings which have at times filled the heart of the ambitious young operator with dismay, and have been the cause of much of the opprobrium that has been cast upon the employment of cohesive gold, are attributable to one or more of three causes : too great cohesiveness of the gold ; deep serrations and finely pointed instruments ; and the use of foil so thin and delicate as to be readily torn and comminuted. Foil of greater tenuity than No. 4, as furnished under the names of corrugated, velvet, and the usual form of Wolrab gold, can only be safely manipulated in mass in the form of cylinders, mats, or rolls, and then only in connection with broad and finely serrated instruments, employed with the greatest care to prevent laceration.

The recent revival of the manufacture and use of the form of gold known as crystal, mat, or plastic gold calls for some notice of this variety before leaving our subject. The use of this form of gold for the filling of teeth dates back some thirty or forty years, and has from time to time found much favor with the profession. Its general use has not been continuous like that of foil, but it has periodically claimed attention and received recognition of its value according as some new process of manufacture or convenience of form has again brought it to the notice of the profession.

Gold thus prepared by a chemical decomposition and subsequent deposition, whether by the usual chemical processes or by electrolysis, appears as a brown powder, and consists entirely of a mass of crystals lightly interlocked. When in this condition, unlike crystalline masses of most metals, it is capable of being compressed into a perfectly solid and homogeneous mass without the aid of heat. Its purity, as well as its extreme cohesiveness and softness of texture, were naturally such as to commend it to our use for the filling of teeth. Such being the case, why has it failed to permanently hold its place among the forms of gold in general use? The answer is easily given. The very qualities which made it valuable led to its abuse. The ease with which it could be placed and packed in position, added to its extra cohesiveness, invited carelessness and led to failure.

Each generation of dentists has been fascinated by its attractive qualities, used it more or less extensively, met with failures, and abandoned it, only to have the same course repeated by the generation following. It has always possessed the good qualities attributed to it, and the best results have been and can be obtained with it when its peculiar properties are thoroughly understood, and when experience in its manipulation has led to overcoming the difficulties attending its use. In its loose and cohesive condition it is not only easily comminuted, but it also so readily coheres with similar masses upon mere contact that spaces are often unconsciously bridged over by it, and the resulting filling, though seemingly compact and homogeneous, is really more or less porous, and hence faulty.

On account of its extreme delicacy and tenderness, success in its use requires that it be most carefully handled and compacted with broad-faced instruments, and that mallet-force for its further condensation be not applied until each piece has been well tamped into position by hand pressure. It is further necessary that each portion be carefully and exactly placed, for once in contact its cohesiveness will prevent even the slightest change.

To manipulate it according to these conditions requires the expenditure of more time and the exercise of greater care than any other form of gold, and for these reasons its use has from time to time been abandoned by the busy practitioner.

In conclusion, we may be allowed to express the opinion that, in spite of its many good qualities, its employment by the inexperienced is always attended with danger, and that all in all, in a practical way, it possesses no advantage over the many other forms of cohesive gold now in use.

METHODS OF FILLING TEETH.*

BY RODRIGUES OTTOLENGUI, M.D.S., NEW YORK, N. Y.

(Concluded from page 722.)

METHODS OF FILLING THE CANALS OF PULPLESS TEETH.

TEETH are filled that they may be saved ; that is, a tooth which is attacked by caries is in danger of destruction and final loss, and a filling is inserted in the hope of saving it from this result. If a tooth which simply has a cavity in it is in a precarious condition, how much more must this be true where the pulp has died ? One might almost say that a tooth which is pulpless is half lost. Its future depends upon the insertion of a proper root-filling ; and where it receives unskillful attention in this direction, only a small chance exists of its long remaining a healthy member of the arch.

The loss of the pulp is not in itself the cause of disaster, for pulpless teeth may remain healthy and useful indefinitely. The trouble is that if the dead pulp be left in, its putrescence becomes a source of excitation which usually results in pericementitis, probably followed by alveolar abscess. The remedy lies in the thorough removal of the pulp, the hygienic cleansing and sterilizing of the canal, and the insertion of a root-filling which will completely replace the pulp, mechanically filling the chamber.

I may, then, at the outset take up a consideration of the obstacles which will hinder the thoroughness of root-filling. There are skillful men, who are also reliable, who will unhesitatingly claim that they fill all roots to, or very nearly to, their apices. This would involve such treatment of the buccal roots of superior molars, and the mesial roots of inferior molars, which are usually admitted to be most difficult. Other men will admit that they are not so successful, but feel assured that they can manage all anterior teeth. That any man practicing dentistry has succeeded in completely filling the canal of every case which he has undertaken, I do not believe. That they may believe that such success has been attained I do not doubt, and therefore I accept such statements as honestly intended, but erroneous from the fact that the gentlemen have not considered teeth except as they have dealt with them in the mouths of patients, under which circumstances failure to reach the apex may be undistinguishable. A study of roots, out of the mouth, and an attempt to fill the canals, would materially alter the opinions of those who are so certain that they always reach the apex. Nevertheless, I think that these men get nearer to the ideal root-filling than do those who are willing to say quickly, "That is as far as I dare to go," and so fill the canal without having made a conscientious effort to cleanse it. I will now consider the canals of various teeth.

Central Incisors.—The superior central incisor is usually a single-rooted tooth, presenting a fairly straight canal. Nevertheless, it must always be borne in mind that the crown of a tooth is not necessarily a guide to the length, shape, or direction of its root. More true of the posterior regions, this axiom is also true of teeth in the anterior

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* Copyright, 1891, by Rodrigues Ottolengui.

part of the jaw. Fig. 201 represents a central incisor whose crown and root are about proportionate, whilst in Fig. 202 is seen another central which has a larger crown and a shorter root. Such short, thick roots are by no means uncommon on central incisors. The point of interest here is, that supposing the dentist is cleansing the canal of a tooth having such a crown as shown in Fig. 202, measurement with a canal instrument might lead him to believe that he had not reached the end of the canal, whereas were he to attempt to go farther he would pass through the apex, forming an opening at the side of the true foramen. I think it may be safely stated that in ninety per cent. of tooth-canals there is a deviation from a straight line just in the foraminal region, so that a drilling instrument would, as I have said, be apt to pass out to one side rather than directly through the foramen. These artificially made openings are almost always mischievous, and the mischief is greater or more uncontrollable in proportion as the drill-hole is nearer the foramen, and so more inaccessible than were it nearer the coronal end of the canal. I said that a central presents a fairly straight root and canal; still, there are frequent cases where the root is twisted or curved, an example of which is shown in Fig. 203. In the illustration the palatal aspect of a central is given, and is chosen in preference to the labial, because of the line of approximate bifurcation seen from this view. This makes it possible that the canal within may be divided, the bifurcation of a pulp usually being coincident with that form of root. This figure also shows a distinct curve near the apex, and exhibits the danger that would accompany the free use of any style of drill that has a point allowing it to make forward cutting.

FIG. 201.

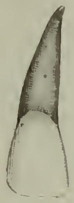


FIG. 202.

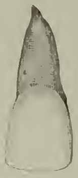


FIG. 203.

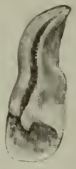


FIG. 204.

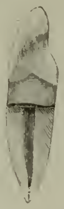
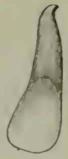


FIG. 205.



The central in the inferior jaw is usually found with a broad, flattened root, which, viewed from the side, presents a concaved groove extending the full length of the root. This groove is very significant, for it is the lateral wall of the canal, so that it follows that the pulp-canal is the narrowest diameter of the tooth. We must also note that these lateral walls are quite thin. If a canal-reamer were used which had a bur-head larger than this narrow diameter of the tooth, it would follow of necessity that this lateral wall would be punctured, so that it is not alone the *forward* cutting of a canal instrument which offers a danger of opening through the roots of teeth. It would rarely if ever be necessary to use a drill or reamer in the lower incisors, because, as seen in Fig. 204, though the canal is flattened laterally, it is usually wide enough in the other direction to afford ample space for cleansing and subsequent filling.

Lateral Incisors.—The roots of superior lateral incisors almost invariably terminate in a crook at the apex which curves posteriorly. In Fig. 205 is shown a curious example. Judging by the general direction of the crown, the course of the root could not be guessed at all. The root curves toward the median line of the mouth at a considerable angle, yet at the apex the rule above stated is found exemplified, there being a crook which turns posteriorly. It is probable that the root of this tooth was upright when in the alveolus, the crown appearing irregularly curved toward the centrals. Were it not discovered that this curve of the root existed, it is evident that were the root drilled, the instrument might emerge somewhere about half-way between the crown and root-end.

Fig. 206 shows another lateral incisor, where we find a crown not much larger than in the last case, whereas the root is much longer. Again is seen the posterior crook at the extremity. An approximal view of this root would show also an apical curve toward the labial plate of the alveolus.

The lateral incisors of the inferior jaw do not materially differ from the centrals, except that they are slightly larger.

Cuspids.—The cuspid is usually the most readily filled of all pulpless teeth. Ordinarily the canals are proportionately large and moderately straight, and one feels fairly satisfied that at least in this tooth the canal may be filled to the extremity. Yet take a handful of cuspids, and an examination of them out of the mouth will show so many crooked extremities, or ends that assume twists and curves, that a doubt is engendered, and one may well wonder whether even here perfect results are always attained. May it not be that because the canal-explorer reports that considerable length of canal has been reached, the operator decides that he must have come to the apex? May there not still be a crook beyond, which has not been touched by instruments, however fine? Compare Figs. 207 and 208. In both, the crowns are about similar in size, yet how different the length of root. In Fig. 207 observe the crook which tips the root end almost at right angles. Look at Fig. 209, with its curved root and crooked end, and, drawing an imaginary line through the central axis of the crown, note where it would emerge through the side of the root were a drill to follow the same course. Fig. 210 shows a double-rooted cuspid, and it would not be difficult to imagine a dentist thoroughly cleansing and filling the labial canal, entirely neglecting the palatal, because of its small size and rarity.

FIG. 206.

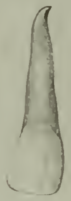


FIG. 207.

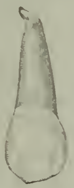


FIG. 208.

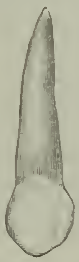


FIG. 209.

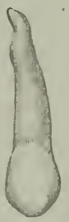
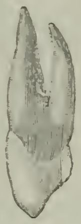


FIG. 210.



Bicuspids.—The first superior bicuspid brings us many problems in root-filling. Usually the canals are bifurcated, whether the roots are or not. Sometimes the canal will be confluent throughout, being connected by a narrow passage, as shown in the diagrammatic section in Fig. 211. Here *a*, *a* indicates the openings to the canals proper, whilst at *b* is seen a narrow passage connecting the two. It is this passage which is a point of great interest. It is almost always present, at least in the pulp-chamber occupying the crown. It is safe to enlarge it, thus completely connecting the two parts of the canal, until the line of the tooth-neck is reached. Beyond this it becomes necessary to observe the greatest caution in proceeding, in order to determine how far such enlargement may be pursued, whether or not the canals are normally connected throughout, or whether they or the roots are bifurcated. In Fig. 212 is shown a first bicuspid wherein the canals are probably united in this way throughout, as I judge by holding the specimen up to the light so that the canals are indicated, and by the further fact that they emerge at a single foramen. Yet observe the curious distortion of the root, and it is plain that enlargement within the canals would be a procedure requiring the utmost care, whilst complete root-filling would be of doubtful possibility.

FIG. 211.

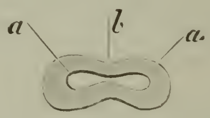


FIG. 212.

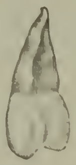
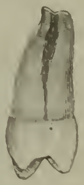


FIG. 213.



In Fig. 213 is shown a tooth the roots of which are united, but examination by passage of light discloses the unmistakable fact that the canals are bifurcated from foramina to tooth-neck. Fig. 214 would show similar canals, though here the roots also are completely bifurcated. Either of these cases would be readily cleansed and filled; but Figs. 215 and 216 show conditions where this would not be so simple, as the roots are not only bifurcated, but badly curved. The obstacles thus offered are more plainly shown in Fig. 215 than in Fig. 216, for the reason that in the latter the worst curve could only be seen from a different view of the tooth, the roots being bent toward the median line of the jaw. In Fig. 217 is seen a root from which the crown has been lost. Here we have trifurcation which pro-

FIG. 214.

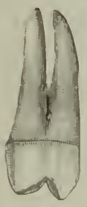


FIG. 215.

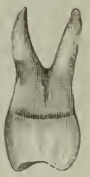


FIG. 216.

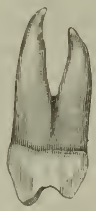
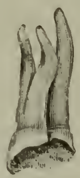


FIG. 217.



duces three roots, and it is plain that the two smaller would be quite troublesome.

The second bicuspid is usually single-rooted, though even here two canals may be distinctly existent. Figs. 218 and 219 indicate that similar crowns may have roots quite dissimilar as to shape and length. The latter has a tiny but distinct right-angled crook at the foramen.

Inferior bicuspids are often difficult because of the length and attenuation of their roots. I do not mean that this is always so, yet Fig. 220, with its small crown and long, narrow root, is a fair example of a lower bicuspid, while Fig. 221 adds to the difficulties of the situation by possessing an extensive crook.

FIG. 218.

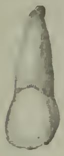


FIG. 219.

FIG. 220.

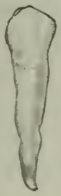


FIG. 221.

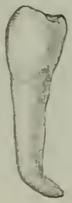
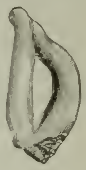


FIG. 222.



Molars.—The buccal roots of the superior molars present probably the most difficult problem in the whole range of root-canal filling. To the prominent gentlemen who have repeatedly asserted that they can fill any buccal root, I offer the pair exhibited in Fig. 222 for study and consideration. To these same gentlemen, and to those who are sure that at least they can fill the palatal root, I offer Fig. 223. Supposing for an instant that they succeed in overcoming the obstacles offered by the crook at the end of each of these roots, I would still ask how to fill the canal of the concrescent tooth seen attached to the palatal root. Lest it be said that such conditions are quite rare, I introduce Fig. 224, wherein the buccal roots are almost identical to those in Fig. 223.

FIG. 223.

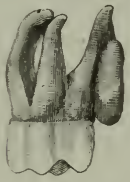


FIG. 224.

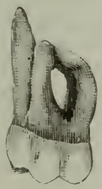


FIG. 225.

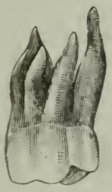
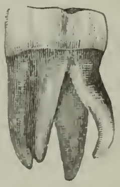


FIG. 226.



In Fig. 225, even supposing the dentist succeeded in filling the badly crooked attenuated palatal root, and the equally distorted main buccal roots, he might overlook the little extra root found between the buccal roots.

In the lower jaw it is usually the anterior molar root that is troublesome. Ordinarily we expect single canals, though in the anterior root the canals are often bifurcated. In Fig. 226 is a specimen wherein the posterior roots are completely bifurcated, one offering so bad a crook that it would have been quite difficult to fill it. In the anterior root two distinct canals exist, though the root is single. This tooth and its fellow, which is exactly similar to it, I removed from the mouth of a negro boy. They are sixth-year molars. This tendency to complete bifurcation is more common in the posterior root. I have a number of specimens which show the double root posteriorly and the single root anteriorly, being similar in general appearance to Fig. 226, the extra root in all being at the posterior lingual angle.

The wisdom-teeth (*dentes sapientiæ*) are so commonly misshapen that it is easier to get specimens with distorted roots than with regularly formed ones. They are also so generally condemned to the forceps that root-filling is seldom practiced. Yet occasionally it is best to make the effort to save such teeth, and I may be pardoned for introducing one or two illustrations, that the student may get an idea of what he may have to contend with.

Fig. 227, from the upper jaw, would be a puzzle, whilst Fig. 228, also an upper tooth, would be equally so, with its three roots all curved, the palatal one forming almost a bow. Fig. 229 is a fair mate to it from the lower jaw, whilst Fig. 230 indicates that we cannot always be sure that a wisdom-tooth is short-rooted. The length of the roots in this case would be almost as great an obstacle to thorough cleansing and filling, as would the curve of the preceding specimen.

FIG. 227.

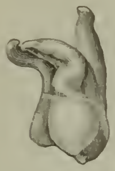


FIG. 228.

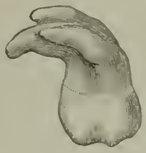


FIG. 229.

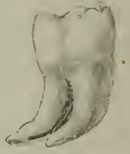
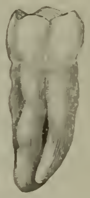


FIG. 230.



Lest it be argued that I have selected extreme cases for illustrating the difficulties to be contended with in filling roots, I must here reply to such a proposition. In the first place, such conditions are not very unusual or difficult to find. That this is true is made plain by the statement that the specimens used here, with a few exceptions, were obtained through the kindness of Dr. Hasbrouck, who allowed me to look through a small lot of teeth extracted in his office. The specimens were selected in about ten minutes. I could have chosen in many instances much more remarkable distortions, but did not think it necessary. I could readily have enlarged the number tenfold, but that also would have been of no advantage. Of wisdom-teeth there was the greatest assortment, possibly because more of these are sacrificed than any other one tooth. The only real rarity among the foregoing illustrations is the two-rooted cuspid. Yet I once removed such a tooth for a young lady, and on the same day extracted a first bicuspid for her mother which had three roots much more marked than those shown in Fig. 217.

Again, I may defend this exhibit by the argument that we cannot learn to anticipate possible difficulties by a study of simple conditions.

It is only by an appreciation of the fact that the roots of teeth are of all manner of shapes, and that the crown is not a sure indication of what we may meet in exploring the roots, that we can hope to exercise that precaution and attain that skill which will make it possible for us to reach that point where we can even fool ourselves into the belief that we are filling all roots to the apices. Yet it is essential that, however great the obstacles may be, we should endeavor to do this; and I will now try to explain the best modes of so doing.

Methods of Gaining Access to and Preparing Root-Canals.

Before a root-canal can be properly filled, it must be thoroughly cleansed and made accessible for the material which is to be used. Admitting that many conditions might occur, as has been indicated by the foregoing illustrations, where it would be impossible or most difficult to fill some canals, it yet is true that many of these can be approximately well cared for where proper methods are employed, and patience and skill are brought to bear upon the obstacles. Conversely, many simple canals are often improperly filled through lack of skill or from laziness. The first object is to attain free access to the canal.

Central Incisors.—The central incisor having ordinarily a straight canal, usually of fairly large size, should offer few obstacles to proper treatment. The cavity of decay must occur either upon one approximal side, upon the palatal, or upon the labial surface. Where it is upon the palatal, the canal is readily entered from that point. When upon the labial, unless the cavity is well extended toward the incisive edge, so that it is not difficult to get directly into the canal, I should make a new opening at the palatal surface. Where the approximal cavity is small, I should do the same; but where large, a simple extension of the palatal border of the cavity should be made until a nerve-canal instrument could be made to enter the canal without bending.

FIG. 231.

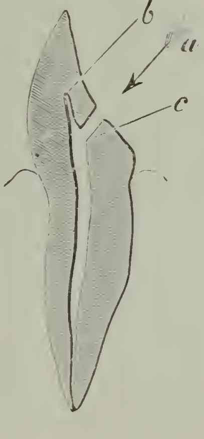
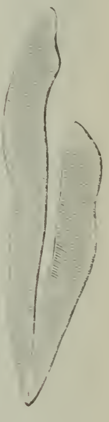


FIG. 232.



Thus it is seen that I advocate entering the central incisor from the palatal surface. This would also be the case where a pulp had died from traumatic disturbance, and, no cavity being present, a drill should be passed in at the point indicated. The enamel being unbroken, and therefore resistant to the drill, it is well with a small corundum point to grind off the polished surface, after which the drill will cut readily. The drill should be sharp and small, making a narrow opening to the pulp-chamber, which is afterward enlarged with fissure-burs. A cone bur also does this rapidly. Fig. 231 is diagrammatic, and indicates the relation between the usual opening of this character and the pulp-canal. Through such an opening it might be possible to pass a flexible broach and remove the pulp, but it is evident that to attempt to fill the root might result in improper treatment of that part between the opening, *a*, and the end of the canal at *b*. Consequently, my custom is to insert a sharp rose bur through the opening as far as the wall of the canal, and then bring it forward toward *b*, removing the part intervening. Even with the opening thus enlarged, ready access will often be impeded because of the angle at *c*, so that with a bur I effect further enlargement, till the canal, fully opened, appears as seen in Fig. 232. Where these canals are large enough, they need no further reaming than at the aperture ; but where they are distorted, attenuated, or partly stopped up because of deposits of secondary dentine along the walls, I use the reamer as far as possible.

As the subject of reaming or not reaming canals is one which is much discussed and disputed, and as seemingly equal authorities will most positively adopt one side to the entire exclusion of the other, I may as well here take up this point and give my own views, based upon my experience. The chief objections to using a reamer to enlarge a canal throughout are, first, the danger of making an aperture through the side of the root or near its apex ; secondly, danger of crowding *débris* forward, so that even where it does not pass through the root, carrying possible infection into the territory beyond, it may become packed into the canal itself, limiting further progress, and so after all preventing the proper drilling or filling of the canal ; lastly, the drill may be broken off and remain in the root.

The advocates of reaming all canals say that by enlarging they insure better filling, and that in teeth where pulps have been long dead the canal-walls are probably in a partly softened and certainly septic condition. In these teeth is it not better to *remove* this, than to endeavor to *disinfect* or to *sterilize* it?

Extremists are not good teachers. The man who reams out every canal to its apex is as unworthy of a following as the other man who can fill all canals without having a reamer in his office. The true method is to have a good assortment of reamers, to know how, when, and where to use them, and to use them with skill and caution that will assure success. I hope that I belong to this last class, and at least I shall describe my methods of using reamers as I go along, indicating where obstacles are to be met and how to avoid them.

I have been asked, "Can you drill around a curve?" The answer is that it can be done, and many times must be done.

Suppose that I am using a reamer, and I feel a resistant spring to my instrument, yet do not strike the end against anything that would indicate that I have reached the region of the foramen. I know at once that the canal has a central curve in it, and that as soon as the head of the reamer reaches this place, the curve of the wall diverting the drill-head, makes a tension upon the flexible shaft so that I get a response which I have described as feeling a resistant spring. This is always a danger signal. Force the instrument a bit farther, and the shaft will snap, breaking off the drill-head. Worse than this, the broken piece will be at such an angle that it cannot be removed. This is made plainer by Diagram 233, where the drill-head is seen at *a*, in a position that makes its removal impossible without very great enlargement of the cavity. Where this happens, it is evident that all the canal beyond must remain unfilled. Consequently, as soon as the springy resistance is noticed the reamer must be removed. If a small-sized Gates-Glidden drill has been used, the largest size may be chosen to replace it. This, having a stouter shaft, may have the power necessary to successfully resist the tension while the drill-head cuts away the bulging wall at *b*. If it was the largest-sized drill that was in use in the first instance, it must be replaced by a fissure-bur of small size, with which the upper bulge at *c* could be removed, after which the large Glidden drill will readily remove the obstacle at *b*. This accomplished by either method, the drill can be advanced as far as *d*, beyond which it cannot be carried. The canal would now present as in Diagram 234. During this work there will be the danger already noted of clogging up by pushing forward *débris*. This may and must be avoided. It results mainly from the desire to work too rapidly, which, by throwing back a great amount of *débris*, renders it difficult to withdraw the drill. It is compelled to cut its way through, and so leaves within the canal some of the chips, which at the next entrance of the drill are pushed forward and packed into the extremity. The proper method is to avoid this, first by frequently withdrawing the drill, cutting only a little at a time, and secondly by using a clean broach every time the drill is removed, with which the *débris* is easily loosened so that it is withdrawn or may be blown out with the air syringe. The continued use of a drill of the Gates-Glidden type cannot open a hole by forward cutting, since it has a safe end. It could make an aperture by lateral cutting, however, if used where the canal has flattened sides and thin walls. This is most common in lower incisors and in first bicuspids, so that these canals should be most carefully scrutinized before the risk of using a drill is taken. Even where it is deemed safe to use it, by every precaution we should be upon the alert to avoid the disaster. The patient should most certainly give a sign of pain before the opening could be actually formed, for the heat from the friction would be conveyed through the thinning wall, causing a response. Thus it is a safe rule to withdraw a drill upon the slightest evidence that it causes pain.

FIG 233.

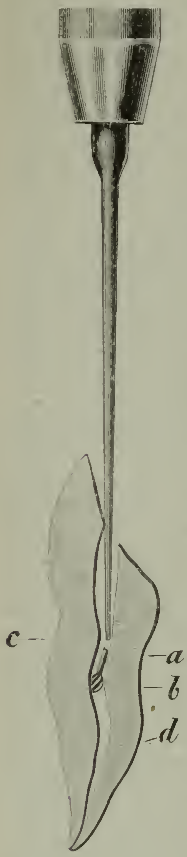
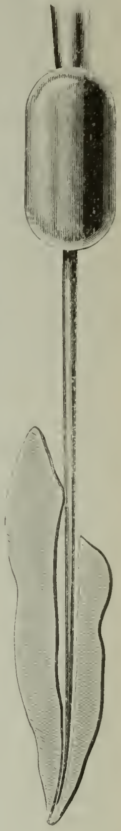


FIG. 234.



In Diagram 234 we have the canal partly prepared ; but as the curve at the extremity prevented the further use of the drill, what are we to do? What has been gained, since it is after all this very part of the root which we should most certainly fill? The reply is, first, we have lost nothing, for *if it were possible, as some claim, to fill this curved* *part without enlargement of the rest of the canal, we assuredly can do so now with greater access.* In fact, we can more certainly accomplish it. The use of broaches will indicate the nature of the curve, for as it is withdrawn now, the curve at its extremity, where it followed the bend of the root, will not be bent back, the enlarged canal allowing it to be freely removed. The upper part of the canal being made as clean as possible with broaches, further procedure is with the Evans root-canal drier. This instrument, having a point of soft platinum or silver connected with a copper bulb, may be inserted hot and pliable. The instrument is seen in position in the canal of Fig. 234, and it is observed that the fine silver point is forced almost to the foramen. In many cases it may even pass to the very end. This is accomplished because the heated point destroys impediments in the way of its progress, and being pliable it readily follows curves.

Thus by the judicious use of canal-drills we may enlarge the openings of canals, gaining such access as will render further cleansing more possible, whilst in many instances curves may be entirely eradicated. Consequently, in all cases it is necessary to open a tooth so that a drill may be used, though it will not always be necessary to use one, whilst such a procedure would sometimes be unwise or even hazardous.

Lateral Incisors.—Lateral incisors are practically the same as centrals. They are, however, smaller, require smaller instruments and greater care, and are more often found with a curved apex. A seemingly straight canal in this tooth, therefore, is to be accepted with greater doubt than where dealing with the central. I have at times withdrawn the Evans root-drier with a sharp crook at its end, showing that it had been forced into a crooked extremity.

Cuspids.—The same rules apply to cuspids as to the incisors. Whilst it is true that these are sometimes short-rooted teeth, ordinarily they have quite long roots, so that the dentist must make a careful examination when his canal-explorers pass but a short distance into the canal of a tooth having a large crown. Where the root is really short, the canal is usually large, the root being thick. Thus it will not be difficult to determine that an abnormal condition is at hand. There is not often much danger of penetrating this root with a Gates-Glidden drill, but the end may sometimes be suddenly attenuated, which will also be the case in the canal, so that the drill may seem to be stopped by the apex of the root, whereas in reality it is simply that the canal has suddenly grown so much smaller that the tip of the drill will not enter it sufficiently to allow the blades behind it an opportunity to cut and so enlarge it. An examination, however, with a fine instrument after the careful removal of *débris* will disclose the fact that the canal continues farther. Perhaps a smaller drill may effect the enlargement, or if not it may be done with a reamer made from a broken Glidden drill. The drill-head being off, the shaft should be stoned on three sides, forming a tapering three-sided reamer. This is a very useful instrument, because it will cut laterally, and is pliable enough to pass curves. But as it will also drill forward, it must be used only with the utmost caution, lest it emerge through the root other than at the foramen. A similar instrument may be made from piano-wire, which, because of its toughness, will not break off in the canal, whilst it will be pliable enough to ream out even tortuous roots to a considerable distance.

Bicuspids.—Generally the bicuspids may be opened for access to the canal either by deepening the crown cavity, or, where it is approximal decay which is present, an extension into the sulcus attains the desired end. In lower teeth, however, this is sometimes troublesome, as will be more fully explained shortly. Where in the upper jaw the cavity is at the neck of the tooth, a new entrance to the canal should be made by entering at the sulcus. Where a tooth, well filled with gold approximally, presents needing to have a canal opened, it will be unwise to remove the filling, as the drill through the crown will serve the purpose adequately and save refilling a difficult cavity.

In the first bicuspid all the peculiarities of form are to be borne constantly in mind, and procedure should be slow and careful. Partial cleansing may disclose the fact that the coronal end of the canal is as represented in Fig. 211. The next point will be to determine just how deep the communicating passage *b* extends, and therefore how far it will be safe to attempt thorough connection of the two canals, for as two canals they should always be treated at the outset. In a few cases it will be possible to unite them throughout. Most often it will be safe to use a rose bur freely as far as the neck of the tooth. Beyond that explorations should be made with fine broaches, passed up one canal and then forced across into the other, where the passage exists. This will prove a guide, but stiff-shanked burs must be discarded for working farther up in the canals, a slender Glidden drill serving better, because, whilst resistant enough to clear out and enlarge any passage which may exist, it will be found difficult with such a tool to cut through solid material. Where the rose bur or fissure-bur is recklessly used for this place, the inevitable result will be that sooner or later the dentist will make an opening near the beginning of the bifurcation of a double-rooted tooth, or even in one that has only bifurcation of the canals, the roots being coalescent, as in Fig. 213. The palatal canal will not be so difficult to cleanse as the labial, and in this latter, drills are to be used with the utmost caution if employed at all. The position of the patient and the tip of the tooth will generally be such that in forcing the drill into the labial canal it will necessarily bend, and to revolve a slender steel shank under such circumstances is to invite a fracture.

On the other hand, the drill will be more easily used after the coronal end of the canal has been thoroughly enlarged, for the reason that, having more space in which to "play," it will be less likely to bend. Sometimes the cavity in the crown itself may be enlarged, so that the drill will more directly enter the canal. When this can, it should be done. The treatment of curved extremities is the same as with the anterior teeth, the Evans root-drier being the dependence.

The second bicuspid in the superior jaw is usually a single-rooted tooth. Nevertheless, here also the coronal opening will frequently be as in Fig. 211, and once more the narrow connecting passage at *b* becomes a point for study. This root, though single, is generally broad and flattened, and viewed out of the mouth often has the peculiarity attributed to lower incisors, there being a depressed groove corresponding with the center of the inner canal. Thus it is seen that throughout the canal the walls on either side, corresponding with *b* in the diagram, are the thinnest part of the tooth. I unite the two broader parts of the canal in a somewhat peculiar way. I use the Glidden drills as though there were two canals, exchanging to larger and larger drills until the two sides are as thoroughly cleansed as possible. This done, I take the smallest of the Glidden set, and, beginning at the coronal extremity of the canal, I pass the drill from one side of the canal through the narrow passage to the other. This is carefully repeated, passing higher and higher up the extent of the canal, until I either clear it throughout or else receive some intimation that it would be unwise to proceed further,—for it must never be forgotten that this tooth also may be bifurcated, at least near the extremity. The least signal of pain from the patient makes it wise to stop work.

The lower bicuspids are often peculiarly difficult because they may be in some abnormal position, the most common and troublesome of which is a tipping inward, so that the labial surface is really partly occluding with the upper teeth. It is plain that in such a pose nothing would be gained by opening through the crown with the hope of using a Glidden drill. Where the cavity is in an approximal surface, however, such extension is often necessary even for the use of a broach, and occasionally the Pettit reamer may be used to advantage. Where the cavity is approximal, but near the gum only, or where it is similarly situated at the labial side, extension must be made along the posterior approximal angle toward, but not necessarily into, the crown. Where it is peremptory to use a drill, as in a case of abscess where the canal is badly narrowed and stopped with secondary dentine, the extension must then follow the center of the labial face, even though it be disfiguring. It is an awkward procedure, but desperate cases demand desperate remedies, and, besides, the labial face of a lower bicuspid is well hidden from view ordinarily.

Molars.—Superior molars having approximal cavities are made accessible by cutting through to the crown. When the cavity occurs elsewhere, but not in the masticating surface, the canals are to be reached not through the original cavity, but through a special opening through the crown made for the purpose. The thorough opening of a pulp-chamber will often require the sacrifice of considerable tooth-substance; but this, though a pity, is unavoidable. No sentimental ideas should tempt the dentist to hesitate to make the opening complete. Where the original cavity is at the posterior approximal surface, some difficulty will be met in cutting through the crown far enough to gain access to the anterior buccal root. The easiest method, and one which will save much distress to the patient, as well as time and labor for the operator, is as follows: With a sharp spear-drill, drill a hole straight to the pulp-chamber through the anterior sulcus. The condition at this point is shown diagrammatically at Fig. 235, which is a section through a molar showing the buccal roots. The approximal cavity and pulp-exposure are seen at *a*, and the new-drilled hole at *b*. The next step is to insert a sharp fissure-bur in this hole at *b*, when, using *c* as a fulcrum, and slowly tipping the instrument as it cuts, a passage is made through the crown with comparative ease. It must be observed here that we have two advantages by this method. First, by cutting from below upward, the enamel is approached from the dentinal side, which is always easier than to attempt to cut enamel from its outer surface. Second, by using the point *c* as a fulcrum much less force need be exerted, and that, having a tendency to lift the tooth from its socket, is less painful than the reverse would be. Moreover, there is less danger of having the tool slip when cutting in a hole, than when the effort is made to cut from the approximal surface directly through the crown.

FIG. 235.

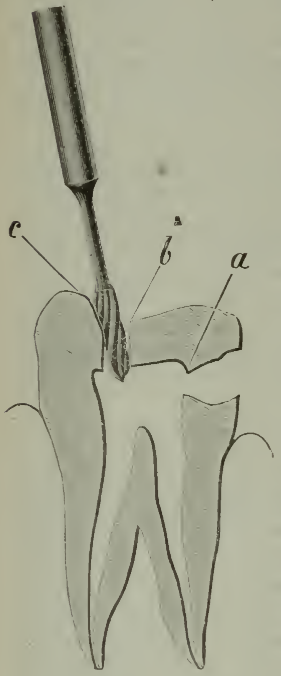
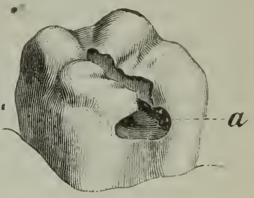


FIG. 236.



This groove being cut, the presentment from the coronal aspect is as shown in Fig. 236. The next step is to choose a large rose bur, and, passing it in at the posterior opening *a*, bring it forward, cutting away the dentine at both sides freely, thus undermining the enamel, which latter may then be removed with a chisel. To those who have not essayed this method a close study of the different steps is advised, for by it otherwise difficult and extensive removals of very dense tooth-structure are made moderately easy.

Where the cavity is at the anterior approximal surface, the pulp-chamber must be entered with large rose burs, and then, using the anterior adjacent tooth as the fulcrum, the procedure is much the same as before, the enamel being undermined from the dentinal side, and then cut away with chisels.

Practically the same rules hold with the lower molars. Here, as is often the case where the pulp is exposed at the buccal cavity, a drill-hole is made as before in the anterior end of the sulcus until the chamber is entered, after which the entire procedure is as though there were no buccal cavity, except where the latter is so large that it is necessary to unite it with the new crown cavity.

WHEN AND HOW TO FILL ROOT-CANALS.

In discussing the actual filling of root-canals, it is essential to consider, at one and the same time, the condition of the tooth and the method of filling its canal ; for despite the fact that many skilled operators have but a single method of treating all roots, I deem it wiser to be guided somewhat by the state of health presented.

Before proceeding, however, I will allude to some of the various materials which have been largely recommended, and comment upon them.

Gold.—Gold at one time was counted the only true material for filling a canal. If the tooth needed gold in the cavity, it also needed this precious metal in the root. The method adopted was to twist a rope of foil stiff enough to allow of its being forced into the canal, and yet soft enough so that it could be condensed thereafter. The method condemns itself, for it is apparent with but a moment's consideration that wherever the foramen was large the rope would be forced through, with the probability of causing future irritation and abscess. This is true of other materials, but in a less degree because of their plasticity. Lest some may claim that I am exaggerating this danger, I may say that I have frequently, in earlier years of practice, removed abscessed roots, finding gold projecting beyond the foramina.

Lead.—Lead has been used considerably, and by some it is claimed that it exerts a therapeutic effect. Just how this is accomplished has never been satisfactorily explained to me, and I doubt its truth. It is used in a single cone, trimmed to shape with the knife, and driven into the root. The same accident of passing through the canal may occur, and again it may be wedged into the upper part of the canal without reaching and filling the foraminal end.

Wood.—Within recent years it has been taught by some that a most excellent way of filling a root-canal is to trim the end of a stick of orange or other wood, and after dipping it into some germicide drive it into the canal, leaving it there. I cannot too strongly condemn this method. Once more we find the material driven through the canal end ; and even where this does not happen, abscesses are common. I have seen a very large number of them. Then, when it is imperative to remove the canal-filling, the operation will prove most trying. The wood splinters, so that it cannot be withdrawn with forceps, tweezers, or pliers, whilst a drill simply tears it to shreds which are still more difficult of removal.

Cotton.—Next to wood, I think this the most despicable thing to leave permanently within a tooth-root. I have heard men tell of removing cotton which had been in teeth for many years, and which had kept the canals sweet, there being a noticeable odor of carbolic acid still present. I always think that the odor is probably due to the fact that the dentist uses that remedy freely, so that he can smell it whenever his own fingers get near to his nostrils. I have removed a great many cotton root-fillings, and have noticed distinct odors in nearly all cases, but they have been far from sweet. They have been of that order which is associated with the dead and the putrescent. In some cases I have unearthed odors which were as vile as anything that had ever assailed my olfactories. I will introduce here a case from the practice of a dental friend which is instructive and suggestive. A physician called upon him, bringing his wife, concerning whose condition the dentist was consulted. The history was that at each menstrual period the woman suffered greatly with neuralgic pains in the uterine region. These increased in severity, and after a time occurred as well in the face. This latter fact, coupled with the time at which the symptoms had first presented, which was directly after having a large amount of dentistry done, suggested to the mind of the husband that possibly the teeth might be the distant cause of all the trouble. My friend made an examination, and finding both central incisors pulpless, hazarded the removal of gold fillings, when he discovered that the roots were filled with cotton. This was removed, and after sterilization they were filled with gutta-percha, and the cavities as before with gold. For six months the neuralgic pains occurred, only in much less severe shocks. As there was some improvement, the husband was encouraged, but decided that there might be other teeth in similar condition, and insisted upon the removal of all the fillings under which there was even a remote possibility of finding cotton. This resulted in such a discovery in three more teeth, and after proper treatment the patient was entirely restored to health. Never fill a root permanently with cotton.

Cements.—The cements, so called, including oxychloride and oxyphosphate, must of course be relied upon in setting crowns, and therefore if they serve in those cases it follows that they must be reliable in any. This, however, must be modified, for where a crown is set, the canal is usually enlarged so considerably that the cement is readily carried to all parts of the root. Where the natural crown is still in place, it might not always be possible to thoroughly fill the canal with such a plastic material. Some claim that oxyphosphate lacks the virtues of oxychloride, but the statement, however authoritatively asserted, would be hard to prove. There is one objection to either which is important. It is difficult to remove them, should it be desirable to empty the canal.

Gutta-Percha.—This material, in some form, is used by the majority of dentists, and rightfully so. The usual custom is to roll the white variety into cones, which are slightly warmed and pressed into the canal. Chloro-percha is most useful when not relied upon alone. Forced into a canal and followed with a cone, it renders the operation of filling oftentimes more easy and more perfect.

Other materials have from time to time been advocated, but none so generally adopted as the ones I have named.

The first condition in which a tooth requires root-filling is where the pulp is freshly removed. Here several phases obtain.

The pulp may be removed fully, coming away so that the operator is thoroughly satisfied that there is none left behind. Here is the ideal place for immediate root-filling. Where the canal is accessible, there is no need for a reamer ; but if it be attenuated or irregular, the reamer is to be cautiously used as has been described. The dam being on, I would use a hot-air syringe, drying the cavity thoroughly, continuing the blast until the patient complains of the heated condition of the tooth. Then I insert a cone of Gilbert's temporary stopping, which I have previously dipped into chloro-percha, and force this up into the canal. Where I am sure that the canal is hot, I do not heat the cone. In a stiff condition it is more readily forced into place, and the heated walls soften it sufficiently so that it is easily packed to the end. This, however, should be done with the utmost care, and the slightest expression of pain from the patient, such as wrinkles between the eyebrows, is a sign to stop. It is a danger signal which, when obeyed, may prevent pressing the material through the apex.

It is to be observed that at the very outset I advocate a material not mentioned in the list upon which I made comments. Still, temporary stopping is a form of gutta-percha, being only that material mixed with wax. I prefer it to the gutta-percha alone, for the reason that it softens at a much lower temperature, and remains so longer. Where I have succeeded in getting the canal-walls properly heated I have often inserted my cone cold, and in a moment found it nearly as plastic as soft wax. It is also less liable to change its shape either by shrinkage or expansion, chloro-percha having been often accused of the one and gutta-percha of the other.

Where the pulp is taken out bit by bit, the reamer is more necessary, as where it can be used it will remove the odontoblasts adherent to the walls.

Where the removal of the pulp is followed by hemorrhage, immediate root-filling is contraindicated, save where the hemorrhage is controllable, as it often is by the packing of cotton dipped in tannin and glycerin or other styptic into the canal, and leaving the dressing there for ten minutes. If the hemorrhage persists, a similar dressing may be left in for twenty-four hours. It should be removed with great care. Drawing it out slowly until it is loosened, and then syringing thoroughly with warm water, will often disengage the cotton from the clot which has formed, and which, if suddenly torn away, will start a new hemorrhage. The clot itself may be removed with a little perseverance, using cotton twisted on a broach and dipped in warm water. This softens it and cleanses the canal. One who has not done this, resting satisfied with simply removing the dressing, will be astonished to see how many twists of cotton will be stained with blood before one can be removed clean.

Again, we have a condition where there will persist a sensitiveness at or near the apex. This may be present, despite the best treatment, for several days, on any one of which the insertion of a root-filling would bring the patient hurrying back to the office within a few hours in great pain. This condition is somewhat mysterious, and the most plausible explanation is as follows: It is not likely that a pulp may be destroyed with arsenic, and when removed leave a portion of the extremity in place, and this be alive. Such a remnant, however, may be left, which would then be connected with the tissues beyond. Where arsenic has been used liberally, or where the patient is easily affected by the drug, it is not difficult to understand that it may have exerted an influence beyond the apex, so that the pericementum has become irritated therefrom. Any pressure against this remnant of pulp, whether by instrument, filling-material, or a column of air, would be conveyed to the tissues beyond the apex, which would respond. Any attempt to fill immediately is an error. The canal should be dressed lightly with an anodyne, and the cavity sealed up, and left for a week or longer. This allows the irritation time to subside, and then filling may be attempted with little danger. Nevertheless, I deem it wiser to be on the safe side here, and have adopted a method which I think is peculiarly my own, but which is nevertheless thoroughly satisfactory.

Take floss silk and wax it thoroughly, after which dip it into chloro-percha and cut it into pieces about an inch long. These, when dry, give us gutta-percha cones which have a silk through them. *They are readily packed into a canal, and the end being allowed to extend beyond the orifice of the canal, is readily grasped, in case of need, with a pair of tweezers, whereupon the whole root-filling is easily withdrawn.* Where no trouble ensues, the root-filling of this kind may safely be left in place, being quite dissimilar from cotton, as the silk fiber is thoroughly incased in gutta-percha.

The next condition is where the pulp has died without the aid of a dentist, and the patient presents with a pericementitis. The treatment is to abort the disease if possible, or in case this fails, hurry it on to the suppurative stage. Where the pericementitis seems to subside without suppurating, I prefer the silk-and-gutta-percha cones, because of their easy removal.

Next we have teeth presenting with abscesses. If the abscess is acute, I think it wiser to cure it before filling the root, except where the tooth is single-rooted, and it is decided to amputate the apex and remove it with the abscess attached. Then it is best to fill the root at once, so that the amputation will not leave an empty canal with a gaping opening at the end. These teeth should be filled with the temporary stopping packed solidly into the root. The amputation is accomplished thus: Select a spear-drill, and with it pass through gum, process, and root, along its central axis as high up as is decided for the amputation. Follow this hole with a sharp fissure-bur, with which, by laterally cutting first one way and then the opposite, the end of the root is easily severed. Where there has been much destruction of the process, its removal will not be difficult. Where, however, this has not occurred, as, for example, in a cuspid where there is a long root and dense alveolus, it may be so difficult to do this that it would be wiser to anesthetize the patient. Then the labial plate of the alveolus may be removed with burs and the amputated root-end extracted.

In chronic abscesses I scarcely ever treat other than surgically, so that immediate root-filling is more permissible here. Still, I prefer the silk and gutta-percha in all cases where there is the least chance that some day this must be removed.

It may be argued that I should not advocate seemingly temporary methods; but while it is true that we should hope to make our work as permanent as possible, in the matter of root-filling, too positive permanence is a detriment rather than an advantage. It never can be certainly asserted of any tooth that its roots will never need to be unfilled. If in no other way, the natural crown may continue to decay till it is lost, when a crowning process may make it imperative to empty the canal or canals. Where they are found filled with a very resistant material, there will always be some difficulty experienced. Again, *I have seen teeth lost, where pericementitis had set in, which could not be adequately treated because the root-canals were so filled that they could not be emptied, the teeth being too sore to the touch to make the necessary drilling possible.* When such a case presents the dentist will quickly say to himself, "I wish this root were filled with temporary stopping, which I could remove with a heated instrument." Of course the other method, using the silk-and-gutta-percha cone, is satisfactory.

Either of these methods require that at least a slight layer of oxyphosphate or oxychloride should cover them before gold is packed upon them. This will be unnecessary where amalgam is to be depended upon.

In concluding this work, I have only to state that in describing the methods that I have successfully used I do so with no special desire to impress my readers with the idea that they are my methods. It seems to me immaterial who originates a method. The main thing is that it be useful. I have learned nearly all that I know from others, and from experience. If I can now teach any one, it will be in some degree a repayment of the debt.

PROCEEDINGS OF DENTAL SOCIETIES.

AMERICAN MEDICAL ASSOCIATION—SECTION OF ORAL AND DENTAL SURGERY.

(Continued from page 663.)

SECOND DAY, JUNE 8.

THE section met pursuant to adjournment at 2.30 P.M., Dr. Taft in the chair.

The committee on nominations reported as follows: Chairman, A. E. Baldwin, of Illinois; secretary, E. S. Talbot, of Illinois; members of executive committee, for three years' term, J. Taft, of Ohio; for two years' term, J. S. Marshall, of Illinois; for one year's term, M. H. Fletcher, of Illinois.

The above officers were unanimously elected.

Dr. T. D. Crothers, of Hartford, Conn., read a paper, of which the following is an abstract, entitled

SOME FACTS RELATIVE TO DISEASES OF THE TEETH AND JAWS IN INEBRIETY.

Seen from the clinical and neurological standpoint, a large proportion of the hereditary cases of inebriety have degenerations and defects of the face, jaws, and teeth; and though no studies have so far indicated any specific degeneration that can be traced to alcohol as the sole cause, nevertheless the inebriate from heredity or other causes has defects, malformations, etc., due to retarded growth of various organs, which are hints of continued organic degeneration. Inebriety or any associated disease in the parent appears prominently in defects of the head, face, and jaws, which vary almost infinitely in diversity and degree. The same variations in quality and capacity exist in the brain. How far the bony structure of the calvarium is controlled as to external form by the brain itself, or how far bony defects influence internal development, is not yet clearly understood. The frequency with which congenital defects of the head and face appear in inebriates suggests a pathological relation in harmony with facts in accord with other degenerative processes. Degenerations from excessive use of alcohol are always transmitted to children, and are manifested in them by physical defects of structure and type, although they may display widely differing degrees of brain-power, from genius to idiocy. Inebriety is often only a developmental disease, beginning in embryonic life, resulting in various degrees of malformations. It is an important question how far a deformed palate and defective teeth can be accepted as evidence of neurotic or alcoholic diathesis. It may be said to be an established fact that the teeth of hereditary neurotics are different in shape and structure from those of persons of different heredity. Some of these defects do not appear in organic form or structure, but in the power and quality of the force displayed.

The effect of alcohol in excess on the teeth is observable by all, and it may be described in general terms as an irritant, impairing the vitality of the mucous membrane, and developing a grade of chronic inflammation that is continuous. The stomach, throat, and mouth become the seat of the degenerative process; the nutrition of the teeth is impaired, the pulp dies, and the gums retract. Beyond this, the effect of alcohol on the system is to paralyze and impoverish the nutritive system; conditions of practical starvation supervene, affecting all growth. Hence degenerate teeth and gums are the natural outcome.

A large proportion of the cases in my care seek the services of a dentist early in the treatment.

When teeth are destroyed and replaced by others, carelessness as to the quality of food, its mastication and methods of eating, are sources of irritation that predispose to the use of spirits. The neurotic diathesis that is seen in the early decay of the teeth will in many cases develop inebriety as a direct result of impoverished brain-nutrition. Irregularity of the teeth is also very prominent in inebriates. Projecting incisors and molars that crowd past each other, and various other deformities, are common.

Some years ago a very large, broad-shouldered, and muscular inebriate came under my care. He had a thin, piping voice. Examination revealed a high, narrow palate-arch with a projecting lower maxillary. He was a hereditary neurotic from an insane and moderate-drinking family. His father had the same high-vaulted palate, but a retreating, imperfectly developed lower maxillary. He had two brothers, one a famous tenor with striking astigmatic face, and who, no doubt, had a high palatine arch. The second had a high arch with a flat dome, with irregular teeth and jaws. Within a year I have seen two children of this patient, both with deformed palate-arches and teeth. They are markedly neurotic, and have strongly marked hereditary degeneracy.

It is a common observation that a thin, high-pitched voice is a possible hint of hereditary degeneration when seen in inebriates, and is often associated with deformed mouth and maxillaries. The observation of Dr. Talbot appears to be amply confirmed in my experience.

Reasoning from the general history of these cases, I should expect to find many deformed palates and teeth and other marks of physical defects, such as cranial and facial deformities, as well as ill-shaped extremities.

Retarded and overgrowths, associated with mental defects, are often the most prominent of all lesions.

From a clinical standpoint, a deformed palate may be taken as an unmistakable sign of neurotic degeneration, which may or may not develop into a distinct form of disease. If with this are associated bad teeth, a tendency to break out into inebriety doubtless exists, due to nerve and cell starvation, for which alcohol is a most seductive narcotic. In a large per cent. of inebriates where a deformed palate is found it can be taken as a sign of nerve and brain degeneration, and will be accompanied by other physical signs of a like import. Further study will reveal mental defects of reason, conduct, and character. The inebriate who has this peculiar arch, with defective maxillary growth, has received from his ancestors a pathological bias which will make a cure difficult.

Dr. Clawson, in his work on the Neuroses of Development, says,—

"If the skull, in its growth and size and its shape, its dome and base, is actually dominated by the brain which it defends and contains, then the brain-growth will in this way secondarily determine the shape of the upper maxillary bone and the palate. The brain unquestionably deriving its shape, size, and qualities from ancestry, and a bad heredity determining a bad brain, we see how a bad nervous heredity would naturally determine an abnormal palate.

"The theory that the shape of the palate is dependent on the nasal cavity, of which it is the floor, seems to me to be without any valid foundation whatever. The upper maxillary bone is related to three functions, viz: alimentation, smell, and facial expression. There is no proof that either smell or mastication is interfered with by a high dome, but unquestionably facial expression is greatly influenced by any change in its form, and facial expression is naturally related directly to the development of the mental part of the brain, and is dependent on it. Speech, I found, is affected slightly by the shape of the palate.

"The theory that deformed palates are due to thumb-sucking in infancy is utterly baseless. Idiots notoriously do not suck well.

"The deformity of the palate occurs during brain-growth early in life, probably in utero.

"We must refer the high palate to a bad initial neurotic heredity, just as we refer a bad type of face or irregular teeth or an asymmetrical head to such heredity.

"Mere accidental changes in the head shape are quite consistent with good brain-development. . . . The savages who make their children's heads square by pressure do not alter the mental or motor function of the brain thereby.

"The vaulted palates and altered dental arches must be taken with other changes in the head, and especially the face expression, as one of the morphological indications that show a tendency in the person to whom they belong and in his family to developmental neurotic diseases. It is thereby one of the marks of a family that is tending toward mental death and extinction.

"As regards the exact mode in which the palate deformity arises, I cannot find any help in the study of the mode of ossification of the upper maxillary bone, except in the cases where the deformity consists in a depression, or two depressions, where the four centers of ossification meet. If the anterior lobes of the brain—and that is the part of the brain that lies above the palate—become contracted through hereditary brain-deficiency, and the skull-base in front is therefore narrowed, while the jaw must remain large enough to hold a normal number of teeth, it might naturally assume more of the shape of the bow of a boat than a horse-shoe, the alveoli of the bicuspids and molars on each side being drawn together by the narrow skull-base from which they hang, and this process would throw up and deform the palate.

"Taking all the facts into account, it seems proved that the condition of the palate may be a most important index of brain-development and of liability to developmental neurosis.

"It seemed to me that consumptives are more apt to have neurotic, and many of them deformed, palates than the sound in body. I did not find any connection, hereditary or otherwise, between the deformed palate and cleft palate. They seem in a way to represent formative tendencies 'in utero' in opposite directions. In the case of the ossifying centers in cleft palates, they had not been able to meet in the centers and close in the floor of the nares, through, perhaps, excessive width of skull-base ; while in the high palate, as we have seen, there was a greater width of palate-bone than was needed to stretch across, and so it had to rise up in the center and form an acute angle or high arch."

Discussion.

Dr. J. Taft said the most remarkable effects noted in the paper were on the shape of the jaw and mouth due to hereditary transmission. These effects were important and undeniable, but the question arose in his mind whether the inebriate suffered any change in the conformation of these parts induced by the habit of drinking.

Dr. Crothers said there were very marked changes, but chiefly those resembling the changes usually brought about in the process of aging.

Dr. Barrett said he understood the essayist to refer to the V-shaped vault as a reversion to the animal type. He thought this was a mistake, as the high or V-shaped vault is not found among animals. It, however, might be true in regard to the V-shaped arch, as this, or rather the saddle-shaped arch, is common in animals, more especially those nearest correlated to man.

Dr. E. S. Talbot. I am much interested in the paper of Dr. Crothers, especially as the author's long connection with the management of an inebriate asylum gives him peculiar advantages for observing these conditions. I will have to take issue, however, with his statements that these peculiarities of the mouth and jaws extend back to uterine life. Every observing dentist knows better than that. The author, being a medical man, has not the opportunity for observing the mouths of all classes which we of the dental profession have. We know that this condition is never found during the existence of the first set of teeth. The deformity begins in the sixth or seventh year.

For several years I have been making a study of these peculiarities in the mouths of idiots, mutes, inebriates, and criminals. In that time I have examined about seven hundred and fifty mouths of inebriates, and have found a larger percentage of badly formed mouths than among any criminal, idiot, or other defective class ; but the defects are not so marked. There are fewer absolutely V-shaped arches among inebriates, but more of what might be called partial V-shaped arches ; but I find plenty of V-shaped arches among criminals, idiots, the deaf and the blind. Now another singular thing : there are twice as many high vaults among inebriates as among any other class of degenerates. This proves that the inebriate is born, that it is impossible for him to live a straight, ordinary life. One born with the qualities that this formation indicates will become either an extreme egotist, a genius in business or in some other direction, or he will be deaf and dumb, idiotic, blind, or an inebriate. I will show this point in a paper I am to read before the neurological section, and will show that the inebriate is diseased.

If we examine a skull, we find quite a space between the hard palate and the brain. If the brain is arrested in its development, the osseous system will likewise be undeveloped; but the arrest of development in the osseous system will be caused by the want of development in the brain. I may say, however, that the lower jaw is developed independently of the rest of the face.

Dr. Fletcher asked whether the fact that both the teeth and the brain were developed from the epiblast had any bearing upon the defective teeth in the classes spoken of.

Dr. Talbot thought that, as the arrest of development was from causes back of the birth of the child, it was reasonable to suppose that there was a defect in the tissue from which the organs originated.

Subject passed.

Dr. G. S. Junkerman, of Cincinnati, Ohio, read a paper, of which we give the following abstract. It was entitled :

Oral Manifestations in Metallic Poisonings.

Many metallic poisons which are non-corrosive in character show the limit of their exhibition in the human system by manifestations of some nature in the oral cavity. Some of the corrosive metallic poisons also show this limit in the mouth. This is especially the case with the escharotic corrosive metallic poisons. This paper will direct attention to the oral manifestations arising from chronic metallic poisonings. There is a slight suspicion that the prolonged exhibition of arsenic, in proper doses to produce medicinal effects, may result in the death of the pulp of one or more of the teeth. There is no authenticated case of this nature ; but the theory of it, based upon the knowledge of the accumulative nature of arsenic, is a good one. Arsenic in its action has a predilection for glandular tissue ; and if it accumulates in the liver, spleen, kidneys, and lymphatics, why should it not use the lymphatics of the pulps of the teeth?

Arsenic does not always destroy by corrosion, but may produce death of the pulp by over-stimulation.

Manifestations of mercurial poisoning are particularly marked in the oral cavity. Mercury has a selective action for the lymphatic glandular system, and the first indication of its presence is an increased flow from the salivary glands. Mercurial poisoning is very destructive to the peridental membrane. This destruction is usually permanent, and is exhibited by soreness and subsequent looseness of the teeth. Mercury in all its forms is synergistic to a destructive metamorphosis. The vitality of the general system is lowered by its internal administration, and the general action of the drug is rather to destroy than to build up the human tissues. The death of pulps too often results from mercurial poisoning. This arises from placing fillings made of amalgam in too close proximity to the pulp. The most skilled operator cannot possibly give to a certainty the correct prognosis of a tooth treated with an amalgam filling. If the tooth escapes mercurial poisoning, it is solely due to the degree of vitality possessed by it, or the diminutive size of the filling preventing a sufficient supply of the poison to produce death of the pulp. Many cases of chronic mercurial poisoning require several years to manifest themselves finally in destruction of the pulp. Teeth into which have been stored large quantities of mercury in the form of amalgam rarely retain the vitality of their pulps for any length of time. Unfortunately for future generations, the tooth does not die the day, and often the year, that it is filled. The injury from the much-vaunted external evaporation and subsequent absorption in the oral cavity of the mercury from amalgam fillings pales into insignificance beside the cases of the absorption of mercury by the canaliculi from the inner walls of the fillings. There is no doubt that many obscure cases of a neuralgic nature might be explained from mercurial poisoning of this kind. The evaporation of mercury from fillings after they have become perfectly set is a theory, and founded mostly upon the imagination. The absorption of mercury by the dentinal tubuli is a well-authenticated fact, which can be verified at all times. The specialist therefore, as well as the general practitioner, must shoulder the responsibilities arising from the administration of mercury, local mercurial poisoning destroying the internal vitality and systemic mercurial poisoning destroying the external vitality of the teeth. The oral manifestation of lead-poisoning is characterized by a blue line at the margin of the gums, usually on the inferior central incisors. In the internal administration of the drug, the slightest appearance of this line marks the beginning of plumbism and where the administration should be stopped. It is claimed by some good authorities that this blue line is due to the deposition of sulphide of lead, and is only found in the mouths of individuals suffering from lead-poisoning and who do not use tooth-brushes.

If this is sometimes true, it is not always the case, for I have found the line in persons with scrupulously clean mouths, and where all attempts to remove it by mechanical means were futile. The blue line must be explained upon some other hypothesis than a mechanical one. The mucous membrane seems to have a selective action for lead, and the blue line is the inflammatory result of the deposition of this irritant. An argument against the mechanical theory also is that the deposition, if it proves to be such, is found in a place very freely bathed in saliva, while those parts of the teeth comparatively free from saliva show no signs at all. The blue line cannot always be taken as proof positive of lead-poisoning. Mercurial poisoning will often produce the same condition; but a differential diagnosis can be made, if not by the history of the case, by the number of the teeth affected, the lead-poisoning being restricted to the front teeth. What is more difficult is a differential diagnosis between lead-poisoning and pyorrhea alveolaris in its first stage. The blue line in both conditions is frequently identical in appearance, and we are compelled to depend upon the history of the case. Time clearly determines the diagnosis, however, lead manifesting its characteristic constitutional symptoms, and the arrival of the pyorrhea alveolaris to the pus stage.

The specialist is frequently the first called upon, on account of the unsightly appearance of these blue lines; and this local symptom may for a long time remain the only sign of the trouble, there being no systemic symptom marked enough to attract attention. This local lead-poisoning may be brought about by the use of tooth-powder. What occasion there is for making lead an ingredient of tooth-powder may not appear clear; but that it has been found there is an authenticated fact. Powdered acetate of lead is usually the compound used, and its virtue to the stupid and unprincipled tooth-powder charlatan lies in its styptic and hæmostatic properties. If you have a case of lead-poisoning, examine the tooth-powder used by the patient. There may be other metals that would manifest their poisonous properties in the mouth; but there are none which on account of their general use manifest their abuse in the oral cavity more than arsenic, mercury, and lead.

Discussion.

Dr. Fletcher said he had not used any of the poisonous substances, with the exception of arsenic, for the devitalization of pulps, and had never seen the blue line on the gum indicating lead-poisoning.

Dr. Barrett did not think the death of the pulp caused by the application of arsenic could be due to over-stimulation, or to anything else than the corrosive effect of the drug. It has been claimed that it is caused by strangulation of the pulp, by causing a swelling of the pulp and a consequent constriction of the apical foramen. The falsity of this idea is proven by the fact that the effect is produced in children's teeth as well as adults', and it is well known that there is no apical foramen in children's teeth; and it produces the same effect on other tissues where there is no possibility of strangulation. As to mercury, we know that this substance has toxicological possibilities which no other substance has; that it is very unstable in its compounds, and apt to unite in new combinations when brought into contact with various substances, and so we need not be surprised at any effect produced by it, provided there be anything with which it could combine to produce a new compound; but he could not conceive that the mercury from an amalgam filling should be absorbed by the tubuli and go back into the system to work harm.

Dr. Talbot asked Dr. Barrett how he explained the dark color in and around teeth having amalgam fillings.

Dr. Barrett thought that in some cases at least it was caused by the union of some of the other components of the amalgam with the fluids of the mouth or teeth.

Dr. A. E. Baldwin said he was ignorant of the use of acetate of lead as an ingredient of tooth-powder, and thought such a reckless use of such a dangerous substance could not be too severely condemned. In regard to the argument of Dr. Barrett that the action of arsenic in the teeth of children proved that this drug does not effect the death of the pulp by means of strangulation, he did not think the proof was conclusive. There might be a strangulation in the blood-vessels, a constriction sufficient to cause the death of the pulp. And in regard to the statement in the paper of the absorption of mercury into the system through the canaliculi of the teeth, we can hardly accept that either. Amalgam is a chemical union of two or more metals, an alloy having peculiarities differing from those of any of the constituent metals, and the mercury could only be absorbed as a vapor. There are more idiosyncrasies of patients in regard to the use of mercury than of any other material. Some are disastrously affected by the mere contact of mercury with any of the membranes, even in small quantities.

Dr. W. W. Allport. Just what the process is by which arsenic effects the death of the pulp is a mooted question; yet he has been inclined to believe that the theory advanced by Dr. Flagg several years ago, that it was by strangulation, is nearly correct. It seemed to him that a little thought would satisfy Dr. Barrett that the effects of arsenic on the pulp of a tooth and upon the soft parts of the mouth were entirely different. When arsenic is applied to the gum, the effect is continuous; applied to the pulp, death occurs within an hour. Another thing: it usually takes longer to destroy the pulp in the tooth of a child than in an adult.

As to the effect of mercury, we all know that teeth long filled with amalgam become brittle, showing that the mercury has affected the structure. This effect, it seems, must be from the evaporation of the mercury, and the vapor would naturally be in the direction of the least resistance,—that is, between the filling and the tooth itself.

Dr. J. Taft said there could be no question of the effect of arsenic upon the soft tissue. A very minute quantity coming in contact with the gum will devitalize that portion of the gum and cause a slough. Some years ago a dentist announced a discovery by which a tooth firmly held in the jaw could be made so the extraction would be an easy matter. His plan was to take a fine string, moisten it, and, after drawing it through arsenious acid, tie it around the neck of the tooth just below the edge of the gum. The action on the gum was such as to make the tooth easy of removal, but the after-effects, of course, were serious.

We cannot explain just how arsenic acts on the pulp; but the fact that the pulp to which it is applied is found to be disintegrated proves that the action is not strangulation.

In regard to the action of mercury on a tooth, when a tooth receives an amalgam filling the tooth-substance may be stained. This staining is not superficial; it penetrates the dentine; sometimes it is not very marked, and sometimes the dentine is blackened through and through from even a very small amalgam filling. This effect is produced by the penetration of the vapor of mercury into the tubules and its oxidation there.

It has been argued here that as amalgam is a chemical union of metals, it does not have the same characteristics of any of its component parts; but we all know that there is always an excess of mercury, so there is no doubt that the material for evaporation is there. Mercury will always vaporize at the temperature of the mouth, or even at a much lower temperature, down to freezing point. This may be tested by exposing a piece of gold foil where there is free mercury; within a few days the surface of the gold foil will be covered with mercury. The distance the vapor will penetrate into the dentine will be determined by the density of the structure. The vapor of mercury is so subtle that it is scarcely possible to get a joint tight enough to hold it. So we see that when teeth are filled with amalgam we have free mercury, and that the vapor will come from it, as the circumstances are in every way favorable. In very susceptible constitutions it is reasonable to believe that it may exert an influence on the general system. I think there are cases in which it does.

Dr. Talbot related experiments by which he had proved that the vapor of mercury was constantly given off even by very old amalgam fillings. He had had patients who had been injuriously affected by amalgam fillings. When the amalgam was removed and gold inserted, they had recovered. He said that he himself was an instance of unusual susceptibility to mercurial poisoning, and that if he should rub up two amalgam fillings in the palm of his hand each day for three successive days, he would be attacked by paralysis agitans.

Dr. Junkerman, in closing the discussion, said that the corrosive effects of arsenic when brought into contact with the soft tissues were well known, as shown when it is accidentally placed in contact with the gum. The stimulating effect upon the system is also well known, and can be tested any time by taking a dose of Fowler's solution. The effect is stimulating and exhilarating, but he thought the effect on the pulp was a corrosive one, as the disintegration of the pulp indicated.

That mercury is absorbed by the tubules of the teeth has been proven by extracting the globules from the dentine of teeth which have been long filled with amalgam.

As to the use of acetate of lead in tooth-powder, he had discovered it from the fact that he had a patient, a lady, who showed indications of lead-poisoning. To try to find the cause of the trouble, he asked her for a sample of her face-powder. This was furnished, and also a sample of her tooth-powder. The face-powder was found to be harmless, but on testing the tooth-powder he was astonished to find that it had the acetate of lead in it.

Dr. Clifford asked why, when mercury was used in excess in copper amalgam, the filling becomes black, but the teeth are not discolored.

Dr. Junkerman said it was possible that the oxide of copper formed, and prevented the absorption of the mercury by the teeth.

The subject was passed.

(To be continued.)

JOINT UNION MEETING OF THE PENNSYLVANIA AND NEW JERSEY STATE DENTAL SOCIETIES.

THE meeting was held at Cresson Springs, Pa., July 21 and 22, 1892. Following is the discussion of Dr. Guilford's paper on "The Cohesive Property of Gold," which is published in full on page 799 of the current number:

Dr. J. Allen Osmun, Newark, N. J. The paper to which we have had the pleasure of listening is on a very interesting subject,—one that touches us in a very practical manner.

On our conceptions and the correct practice of the principles enunciated depends much of our success in the daily operations we make. If we fail to grasp the fundamental principles, affecting the availability as well as the limitations in the use of gold as a filling-material, then failure must be the inevitable result.

Commencing with the source and the preparation of gold for dental use, and the theories extant concerning cohesion, Dr. Guilford has grouped and placed together those well-known facts in a manner helpful to a full comprehension of the subject.

It does seem necessary to repeat again and again any theory or practice in order to make an impression upon the mind or to secure its adoption.

Passing over the opening paragraphs of the paper without further comment, we will consider somewhat in detail the more practical ideas which it contains.

He has given us a very clear history of non-cohesive foil and its peculiar properties, and emphasized its adaptability to the walls of the cavity. It is this quality that is the great object to be attained in all filling-materials. If we fail to get perfect adaptation, the whole operation results in failure. The use of non-cohesive foil, as used in the past, necessitated great loss of tooth-substance ; yet in many cases teeth were preserved in a marvelous manner. I have seen fillings of non-cohesive foil that have stood the test of many years,—in one case about fifty.

The next point brought out in the paper is the history of the use of cohesive foil, and it is shown very clearly how the good qualities of this filling-material have been abused, and how in its use the very fundamental principles of successful filling have been violated and its limitations entirely forgotten. As it is quite possible that this point has not impressed itself on your minds, in the somewhat hurried reading of the paper, I will trespass on your patience a moment to emphasize it. I am not an advocate of non-cohesive foil for universal work, but am a firm believer in the value and usefulness of semi-cohesive gold which is soft, and used as semi-cohesive or cohesive as I wish and the exigencies of the case demand. Many of the failures in gold fillings which I have seen can be traced to the employment of gold made too cohesive, and the failure to get perfect adaptation to the walls of the cavity. I think that an inquiry in this direction will show not so much fault in the preparation of the cavity, of which we hear so much, but in nearly all the cases it will be found that the cause was in not having the gold in perfect adaptation.

The point made about annealing I consider important. I believe the only way to anneal gold to meet the various requirements of any case we may have in hand is to anneal by the flame, and as we desire to use it ; thus we can practically have non-cohesive, or soft, semi-cohesive, and cohesive, as required. For finishing fillings so as to have a hard surface which will take a high polish, by using heavy rolled gold, Nos. 30, 60, or heavier, and annealing to a cherry red, you will produce a filling which will retain a high polish and will not pit.

On one point I am compelled to differ very materially with the conclusions of the writer. In speaking of the forms and character of the points used in condensing cohesive foil, he says in substance that the points should be of good size. I take it he means quite large ones. If this is so, I must dissent from his decision. I believe that gold can be more effectually condensed and placed in closer contact with the walls of the cavity by the use of medium or small points than by the use of large ones. I must enter a protest against the use of foot-pluggers. I am convinced that the extensive use of this style of plugger has been the cause of more failures in gold fillings than in any other one that can be named, not excepting the improper shaping of the cavity. I will admit that a few can produce good results by their use, but it is not the few that we should consider, but the great majority of operators, especially the men who find it easy to use large masses of gold, foot-pluggers, and strive thus to attain speed rather than thoroughness.

The point made of having slight and delicate serrations I am fully in accord with, and believe this is a valuable suggestion, and worthy of more than a passing notice.

The essayist calls attention to pitting and scaling of gold fillings, and attributes it to one or more of three causes :

"The deep serrations and finely pointed instruments, and the use of foil so thin and delicate as to be readily torn." I am inclined to think that this condition is due rather to lack of thorough condensing, because if thoroughly condensed it would make no difference how thin the foil or how small the point used in condensing the filling.

Now a word respecting the revival of the use of crystal mat or plastic gold spoken of in the paper.

I am convinced by personal use and by observation that the cause of the many failures in the use of this style of gold is attributable almost, if not entirely, to its great cohesiveness, and the absence of the sliding or slipping property observed in semi-cohesive or the non-cohesive variety of gold foil, which allows of a close conformity to all of the inequalities of the cavity wall, and produces a perfect joint between tooth-substance and filling-material. This has been accomplished by many operators, who have produced beautiful work by the use of crystal gold. I have recently seen some which have been in service for nearly seventeen years, that are marvels of perfect workmanship. After all, it is a question of skill rather than of material.

The great object we all should strive for is to be equally skillful in the use of all the various styles of gold, and by a diversified practice we can then best meet, in a scientific and skillful manner, all the various conditions we are called upon to treat, and nothing less than this should ever satisfy any operator.

Dr. W. E. Magill. It was a very interesting period in dental practice when the change was made from using non-cohesive gold to the cohesive form. In the earlier stages of my practice we had no choice, except between non-cohesive gold and tin foil. It was then considered unprofessional to use what was then called succedaneum, now known as amalgam, which was only used by itinerants. They traveled through the country, stopping here and there, and their use of it gave it its reputation.

The principle on which we filled teeth then was entirely different from that taught in the schools. If we had a grinding-surface cavity, it was filled on the same principle either with tin or with gold. We made ropes of the foil and folded them into the cavity, leaving a portion of the rope projecting out of the cavity for subsequent condensation ; and we worked it in that way until the cavity was well filled ; we then condensed and finished up the margins. But the final condensation was not made with the mallet until Dr. Atkinson introduced its use, but was done with heavy hand-pressure and a large-faced instrument. There was a great deal of muscular effort used at that time in filling a tooth. When we came to approximal cavities, the greatest skill of the dentist was called for. We were sometimes very badly troubled to retain the gold where the cavity was somewhat shallow. The dentist of that day had no idea of retaining-points, and indeed they would not amount to much with non-cohesive foil ; but he did groove somewhat the buccal and lingual walls. He rarely considered the form of grinding-surface cavities, and had perhaps little idea of dovetailing them. He commenced at the bottom of the cavity, and packed in such large folds of foil that they would not escape him, using two instruments, one to steady the earlier-placed pieces of foil until he had them tied, and another to carry the foil. After placing the gold at one side, he carried other folds down on the side, and ultimately divided those, driving the outer and inner portions apart, as with a wedge, and then finishing in the center. There were a few men who prided themselves upon grinding-surface fillings by this process: they packed their gold reasonably well by hand, and then drove some little pointed pieces of gold wire into the center of the filling, expecting by that wedging process to get a more compact filling. It was the final packing and condensation of the filling that the dentist relied upon.

It was a great comfort to the average dentist of that day to have a soft foil having little cohesion, and tin foil came to be much used. Tin foil came to have the reputation of being a chemical tooth-preserver, the idea being that there were certain qualities in the tin foil itself which tended to arrest decay. From the mechanical qualities of the foil it packed tighter under pressure; and when we took one of those tin-foil fillings out of a tooth it was very clean and nice, and we did not find much decay following it.

Dr. Guilford has gone somewhat into the principle connected with filling. Perhaps for our general guidance it would be better to adopt the principle that two plane surfaces most easily cohere. I think that when we twist foil we interfere with its ready condensation. Where Dr. Guilford spoke of No. 30 foil and the higher numbers, he was not careful enough to guard against the liability of cramming. If you are not careful to keep up the even surface, then you are sure to produce faults that you cannot remedy.

I do not agree with the last speaker in regard to the cause of the defects of sponge gold. Sponge, or crystal gold, as it was introduced in the earlier days, seemed to be a very beautiful preparation. It was of very high cohesion, and it did make hard fillings, though it did make very faulty fillings: very nice on the surface, but imperfect underneath. The high hopes that were entertained in regard to it were dashed. The apparent disintegration of such fillings was so frequent that sponge gold had a very short life. If gold of that class is to be used, it should not be used in large masses, and not with large instruments. The principle consists in the use of very minute portions of the gold, and it requires great patience in packing it. As soon as that kind of gold is used in large quantities, the fillings will be of no value; and if any gold is not used with patient labor and nice manipulation, just so surely will good work not be done. So I think we should give all honor to the man who makes good fillings with crystal gold. That good work represents the patience, energy, and honesty of purpose and integrity that is inside of the man who does it. I think it has been truly said that common sense is the best material to use in our operations, but I also think that integrity of purpose and a determination to make good work is worth everything.

Dr. Thomas C. Stellwagen. Mr. President, the paper we have heard to-night contains so few points to which we can take exception, that it does not invite much discussion; but there are two points which I think may admit of further investigation. One is where Dr. Guilford speaks of the use of non-cohesive gold by driving one particle into another, and cutting through the surface and bringing into apposition the parts of the sheet which were not upon the surface. I think he intimates there that we have cohesion as the result. Now, of course, we are all aware that the manufacture of non-cohesive gold is a secret,—a secret that is very closely guarded, and one that I have often endeavored to find out. The Messrs. Abbey, or one of them, who manufactured the foil, told me some years ago that it was a quite common thing to find that their gold came out cohesive, and that after attempting to work it they found it so cohesive that they could do nothing with it, and they would put it back again into the pot. Those were days when cohesive gold was not known in practice as a material for filling teeth. Now, if he told me truly, and I have every reason to believe he did, it would show that the non-cohesive property was something not attributable to any condition of the surface of the gold, but to something in the gold itself. We know that non-cohesive gold is proven to be 998 and 999 fine, and yet it could not be made cohesive by any amount of heating, or any means that I have ever tried, and I have tried a great many ways; I could not get it so that it would be cohesive upon the surface or anywhere else. Furthermore, I would say that cohesion is not necessarily a property of pure gold only. Mr. Abbey gave me some gold which he told me was alloyed with silver; it had the appearance of gold foil that had been kept in a book for years, where the edges of the foil have been subject to atmospheric action. There was an appearance of darkening or discoloration, very similar to what we would have with cylinders, and which is probably due to sulphur in the air; and this foil, although it contains only about sixty per cent. of gold, about two-thirds gold and one-third silver, is as cohesive, I think, as any cohesive gold I ever had.

The advantages of cohesive and non-cohesive gold have been, I think, so fairly stated in the paper that it is unnecessary to reiterate point by point. I think that many operators of the present day are losing sight of one very important matter: that is, that in our operations we are performing them upon living subjects, and the more we can facilitate or hasten our operations the less strain we put upon our patients by long-continued operations. I think that should be very carefully considered. I know that a great many people for whom I have operated at different times have objected very seriously to long-continued and tedious operations, such as are necessary in making cohesive-gold fillings, and I am sure that in cavities with solid walls the wedging process, with non-cohesive gold, will shorten the time very materially indeed.

Dr. Edward C. Kirk. Mr. President, Dr. Stellwagen has brought out a very interesting feature of Dr. Guilford's paper: that is, the question of the impurities in gold foils as modifying their physical properties. He has stated that all the gold foils we use are nearly pure, but there is just that little qualification that makes the difference. I think I am safe in the statement that it is upon this small amount of impurity that the different working qualities of gold foil depend; and not only upon the amount of the impurity, but the nature of the impurity.

Dr. Stellwagen has told us that gold alloyed with silver is not markedly affected as to its cohesiveness. That statement is consistent with certain principles related to the combinations of metals known as alloys. Thus we find that when gold is alloyed with a metal that has no affinity for oxygen, the purity and integrity of its metallic surface is retained, and cohesion between such surfaces is possible. Whenever cohesion is lost, it is lost by virtue of some impurity on the metallic surface.

Some years ago, while preparing the metallurgical article in the "American System of Dentistry," I had occasion to investigate this question pretty thoroughly, and if you will bear with me a moment I will give you the record of the analyses that I had made of some of the gold foils in the market, also a record of some other analyses made by Dr. Stillman, of the Stevens Institute of Technology, New Jersey. There were some eight or ten assays made. Among these there were two samples of Abbey's non-cohesive gold assayed, which gave respectively in 1000 parts, 998.8 and 998.7; Wolrab's, 999.2 and 999.3; S. S. White Dental Manufacturing Company's Quarter Century, 999.1 and 999.1; Rowan's Decimal Foil, 999.9 and 999.8.

The assays made by Dr. Stillman, of the Stevens Institute of Technology, were: S. S. White Company, 999 fine. William Valleau, New York, 998.7; traces of copper and aluminum. Ed. Rowan, New York, 999; traces of lead and silver. E. Kearsing, Brooklyn, 998.4; small amount of lead was found. R. S. Williams, New York, 999; traces of platinum found. Wolrab's, 999.8; no traces of any other metal present.

Now, that slight falling off from 1000 fine looks like a very little thing, but if the impurity represented by that small fraction were phosphorus or sulphur in steel, it would render the product absolutely worthless; it would modify the whole physical character of the metal.

The investigations made by Dr. Black, some years ago, show that impurities from the atmosphere will modify the cohesiveness of gold foil, and that impurities which affect only the surface will destroy its cohesive quality as well as those fixed impurities which are part of the gold itself.

I think we lay too much stress on the question of the absolute purity of gold. One of the qualities of pure gold is a relatively great degree of softness, but we do not always want that. The very thing that makes Abbey's foil desirable is the small fraction of impurity it contains. I think it is undoubtedly a fixed impurity, because the samples I had assayed at the Philadelphia mint were all heated to a bright redness before the assay was made. There was no other desire in making the assays but to decide the question of the constituents of the foils. The assays showed that Abbey's foil was the least pure; but, on the other hand, it possesses its own peculiar properties that make it invaluable for certain uses as a filling-material.

There was another point in the paper that is worth while calling attention to. Dr. Guilford claims that it is immaterial whether you anneal your foil over an alcohol lamp or over a Bunsen burner. Now, the coal-gas supplied to us is always more or less impure, and more or less contaminated with sulphur. You have noticed that the metallic shields hung over gas-lamps become coated and discolored; and a metal chimney will, in a short time, be corroded by the products of combustion of coal-gas. There is a marked affinity between sulphur and gold. Sulphur destroys the cohesiveness of gold and renders it brittle. I think the gold should not come in contact with the flame in annealing, if the highest degree of cohesiveness is desired. It should be annealed on mica. If you want semi-cohesiveness, you can warm it over an alcohol lamp. I must, therefore, take exception to the advice to use a Bunsen burner for annealing, and, for the reasons given, always employ an alcohol flame, which should preferably be burned from an asbestos wick.

(To be continued.)

DENTAL SOCIETY OF THE STATE OF NEW YORK.

(Continued from page 740.)

SECOND DAY—*Morning Session.*

DR. C. F. W. BÖDECKER read a paper entitled "The Herbst Method of Treating Pulps." *

Discussion.

Dr. R. R. Andrews, Cambridge, Mass. When Dr. Herbst came among us several years ago, we found him a man of original ideas. We appreciated his very ingenious methods, and honored him as a man. He comes before us to-day with yet another new idea,—not in the line of mechanical appliances, but in regard to the treatment of exposed pulps of teeth. We esteem the man who has the courage to be in the advance guard, who shall bring to us any original methods; but it is our duty to see that those methods will stand the test of criticism. Why is cobalt used with his cocaine?

Is it not to destroy the pulp? Cobalt is a material which has been used for this purpose by a number of operators, and it was used many years ago. In an article in the DENTAL COSMOS, published in 1866, Dr. W. Dickinson, of Charles City, Iowa, writes thus: "Having arrived at the conclusion by accurate examination that the nerve (pulp) must die at my hands, I carefully excavate all the carious matter that I can from the cavity without giving too much pain, trying at the same time to fairly expose the pulp, if not already exposed. I then place in the cavity a small pledget of cotton moistened with creasote and cobalt, taking particular care that it is in direct contact with the nerve (pulp).

"I cover in the usual manner, and dismiss the patient until next day, when I thoroughly remove the nerve with a fine nerve-needle."

He finds cobalt in every way as effective as arsenic,—quite as quick to destroy the pulp, but without so much pain. He says that while in many cases arsenic is as good as any other material, he thinks for general use cobalt is better. He finds it takes from fifteen to twenty hours to destroy the pulp. He cautions the patient to remove the application of cobalt, if prevented from coming the succeeding day after it is made. "It will be seen," he says, "that I do not consider cobalt perfectly safe, but I think it is safer and quite as effective as arsenic." One authority tells us that arsenic exists in the uncombined state as native arsenic, and is known also under the name of cobaltum or "fly-stone." While cobalt is not arsenic, it is always associated with it. Its name is derived from the German Kobold, a miner's term for gnome, or evil thing. Dr. Herbst tells us that he takes a small quantity of this material and cocaine, which he applies to an exposed pulp, covers with a temporary filling, and leaves for two days, a day longer than Dr. Dickinson finds it necessary to leave it in the cavity to destroy the pulp.

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* For Dr. Bödecker's paper, see page 773, current number.

Then the cavity is cleansed from decay, disinfected, and by means of a round bur revolving in the dental engine the coronal portion of the pulp is amputated, the cavity washed out, dried, and a cylinder or ball of No. 4 tin is burnished tightly into the pulp-chamber, closing up the pulp-stumps. There may be something in the combination of cocaine and cobalt which changes the nature of the cobalt, but this I doubt. How many of us would expect to find live pulps under this tin capping in the teeth that we have to deal with?

To me this treatment seems to be unscientific and misleading, a dangerous one to propose to young practitioners, and on a par with the proposition made by an old dentist in Philadelphia, some years ago, of applying arsenical paste to the tissues surrounding a difficult root to be removed; and after the tissue had sloughed away, and the root found loose in the inflamed tissue, it was to be extracted; or on a par with the practice of some dentists to-day, who apply arsenic to shallow, sensitive cavities to obtund the dentine. As much as I have admired the clever appliances of Dr. Herbst, I cannot accept his method of treatment of the exposed pulp.

Nor do I believe that finding a calcified pulp in two cases proves that this treatment results in this way as a rule. I should first want to inquire why these teeth were extracted so soon after *successful* treatment? And secondly, to suggest that possibly this observed calcification may have taken place previous to his treatment, and the irritation caused thereby had been the primary cause for such treatment. I should rather believe that he would have better success by bringing about calcification of the pulp-tissues in the root-canals by the use of cocaine alone, without the devitalizing agent: though this method would not be practiced by many of us who have known of the intense neuralgias occasioned by the irritation of the nerves of the pulp by its calcifying elements. And then again I would ask if there be need of a change in our successful scientific methods of to-day? How many skillful operators do have serious trouble, and how many wish for better success than that which results from these methods?

Dr. Bödecker has said that the cobalt is put in to destroy the pulp, and after it is destroyed new life comes in some mysterious way. It not only extends throughout the root, but he finds the reticulum alive in the crown. I would ask him how he finds a live reticulum in a dead tooth? Perhaps he will say it *might* have been alive, but he says distinctly that it was *positively* alive. How is it possible for tissues in this portion of the tooth to be found alive when there is only a portion of the pulp alive? He says through the reticulum there is a net-work of fibers between the tubes or canals of the dentine. I do not understand that to be what he calls a reticulum; but after a tooth is dead, is life going to force its way into a dead portion? I have always told my pupils in my lectures that it is very necessary to cut away those portions of tooth-structure in filling a tooth that had been cut across, because it is dead tissue, and sooner or later that point will be found to be weak; but if it is true, as Dr. Bödecker says, we do not need to take the trouble. If in a dead tooth this change will come about, it certainly must come in a live tooth. If my work with the microscope proves anything, it proves that this is against all laws, either histological, physiological, pathological, or simply logical.

[Dr. Jarvie read the following statement of Dr. Black, who was unable to be present:]

Dr. G. V. Black, Jacksonville, Ill. This paper, it seems from the abstract before me, details methods practiced by Dr. Herbst, of Bremen, and refers to a mode of capping the canal portions of the pulps of teeth after amputation of the crown portion, with the view of retaining such canal portions alive.

In the early times of the endeavor to treat teeth with exposed pulps in this country, many efforts bearing a similarity to the one here advanced were made, and plans closely resembling some of these earlier methods are frequently being proposed. This plan, then, except as to some of its details, does not strike me as new or unfamiliar.

That some teeth thus treated may do well, I have no doubt. I have seen results which justify this conclusion. Dr. Witzell, of Essen, in his work, "Compendium der Pathologie und Therapie der Pulpakrankheiten des Zähnes," details plans (pages 42–44) that are similar except as to the material used, and he claims success. I have myself used, and still use in a certain class of cases, a similar method, and am successful in a sufficient number to continue the practice. These are cases in which the pulp has become involved to such an extent as to render the removal of some portion of it necessary in teeth of young persons in which the roots are not yet complete, rendering the removal of the canal portions and the filling of the roots impracticable. In these I usually use gutta-percha instead of tin, and I am of the opinion that this is the better material. But the few of these cases that I have had have not succeeded so uniformly as to induce me to make use of this procedure when it is possible to make root-fillings.

The fact that some cases succeed by this or that method is not conclusive as to the merits of the mode of procedure. I remember several pulp-cappings made by laying a piece of gold plate over a wide exposure, leaving a hollow space beneath, that were successful, as shown by the removal of the fillings years afterward. One of these, made by Dr. Forbes, of St. Louis, before the war, which came into my hands twenty years afterward, abscessed, succeeded so well that the pulp had extended against the bit of gold plate and had become calcified; also nearly all of the pulp had suffered the same fate, so that I had much difficulty in removing these calcifications and reaching the apices of the canals. While this case and a few others treated by this method were successful, it is not to be recommended on that account, unless it can also be shown that the plan is generally successful, or can be made so, in the hands of the average practitioner.

This case leads me to speak of the results of the examination of the teeth presented by Dr. Herbst. The statement is that the pulps were much calcified. This has been looked upon by many as desirable. My studies of cases have led me to regard calcification to more than a very limited amount immediately about an exposure as a very sure precursor of the death of the organ, and subsequent alveolar abscess. The pulp-capping that is to be a continued success must conserve the health of the organ and the integrity of its tissue, rather than induce destructive calcification. I should regard the results of the examination, as given in this brief synopsis, as unfavorable to the continued health of the teeth, for certainly if the canal portion of the pulp is largely calcified in two or three years, it will be devitalized and liable to abscess within five years. A tooth from which the pulp has been removed from the canals and the canals filled, as well as the average of fairly good American dentists can do it, would be much more likely to do twenty-five years of good service.

I have now had an experience in filling the roots of teeth extending from parent to children and grandchildren continuously in the same families; and excepting a few that I was foolish enough to fill with cotton, medicated with carbolic acid or otherwise, I can say that the time has not yet been long enough for them to fail, or for abscess to occur. There have been failures, to be sure, but they have been too few to affect the rule of general success. These root-fillings are of gold or gutta-percha. Many dentists are equally successful with this procedure; indeed, nearly all are who are skillful and faithful in manipulation. Then certainly we should think twice, or even more than twice, before adopting in its stead a method which has not the test of time in its favor, and which seems to violate well-grounded rules of procedure, and suggests probably evil results in the future.

Again, it should be remembered that some enthusiastic persons may follow out certain modes of practice successfully which cannot be successfully followed by many practitioners. Similar conditions are continually cropping out in both dental and medical practice. This man does such and such things successfully, but others in attempting to follow him will fail. In such instances there is something depending upon the peculiar tact of the individual that is not transferred to his neighbor.

These are not modes of procedure that we should recommend to the general profession, but rather we should cling to those with which the many will succeed.

Dr. W. C. Barrett. I do not know that I am competent to discuss this paper entirely. I must say that, at first appearance, the paper seems to be utterly unscientific. It is not safe practice. However, two or three times in the course of my life I have found myself mistaken, and sometimes badly mistaken. I remember when the principle concerning implantation of teeth first came up before the profession, I pronounced it unscientific, unphysiological, and something that was entirely beyond the province of dentists to attempt, and yet we have lived to see the time when teeth have been implanted for a considerable time. I have been so often mistaken, that I am rather careful as to how I pronounce upon things; and when Dr. Bödecker came to me and said he had tried this, I said to him, "You must not waste your time on any kind of nonsense like this." However, he persisted, until finally he was successful. I do not know how he can be, and yet there is the fact.

Have we been so mistaken as to this? Must the pulp be absolutely removed, and must the canals be rendered entirely aseptic before we can be sure of the permanence of the operation? Years ago, before we knew anything about antiseptic treatment, men like Dwinelle successfully filled dead teeth, and they lasted for years. I believe in antiseptic surgery as firmly as I ever did, but there are certain other things which must be taken into consideration, and here in this case must be something which takes the place of the antiseptic precaution which I spoke of.

I want Dr. Bödecker to give us more of the results of this thing, and see whether we have been utterly mistaken in the past. I do not think we have, but there may be a factor somewhere which we do not comprehend. I am willing to accept considerable at Dr. Bödecker's hands. I am willing to listen to what he says, and willing to learn. Is there something in the reticulum that we cannot comprehend, or what is it that he gives us his word for? I want to see these things experimented upon and tried.

Dr. C. P. Schultz. Although root-filling has been brought to a state of perfection which can hardly be excelled, we must admit that the results often fall short of our expectations. If we should extract some of the molars which have been conscientiously treated and filled, we would undoubtedly find that perhaps half of them have not been treated as we thought they were. Of the upper molars, perhaps only one root has been thoroughly filled, and of the lower molars, where the two roots often open into other channels, we would find that the fillings were faulty. If we admit that this is true, then the question would arise, Why, notwithstanding the fact that the roots have been so indifferently filled, have there been so few failures? Perhaps we will find an explanation in the fact that the greatest part of the tissue has been removed. There are certain things which we can do, and others which we cannot. Sometimes we cannot find the opening into the roots, not to speak of filling them. I believe that the operation under discussion is in relation to this proposition. I presume Dr. Bödecker is right as to the theory of secondary dentine, and I confine myself only to the observations which I have made in the office of Dr. Herbst, also in my own practice, and of the few individuals who have had the courage to follow my suggestion. I have been well versed in the methods of men like Black and Cushing, of Chicago, who have so fully developed the system of root-filling. When I came to Dr. Herbst as a student, he introduced to me this new method of treating devitalized teeth. In many respects I agreed with him, but here I had to draw the line. Although the results were good, I could not see how it was possible that, after removing the pulp, the tooth should not give trouble. He said, "I have been practicing this method for over five years, and you will see whether or not I have any complaints." As none occurred, I agreed, after a great deal of hesitation, to try the experiment.

Amputating the pulp has been advocated by Dr. Allport, but that and the Herbst method of treating the pulp should not be confounded. Dr. Allport, if he should wound a nerve by accident, simply cuts away that part and fills on top, whereas Herbst fills all the bulky part of the pulp-chamber, and only leaves that portion of tissue which is comparatively small and insignificant. It is not the amputation of the pulp, as Dr. Allport puts it, but the cutting away of part of the pulp.

If we could find a means to do away with the tedious and expensive system of root-filling, it would be a benefit to humanity. There are thousands of teeth extracted in this country, as well as in Europe, which could be saved if the dentist had the means to do his work in a quicker way; but when the patient presents himself to have a root filled, and the dentist makes the suggestion that he must come three or four times, and that it will cost him considerable money, the patient says, "I cannot afford it; pull it out;" or the dentist says the tooth must come out, because he knows that to leave a dead pulp in the tooth without further treatment would be poor practice, and probably give trouble afterward. If the same man had the means of doing away with the whole difficulty in a half-hour's time, he would be tempted to use other instruments than the forceps, and save the tooth.

I have done the whole operation in a half-hour, including the filling of the crown, whereas with the other method it takes two or three sittings to accomplish that. I have treated three or four hundred cases, and of course there have been some failures, particularly in the first period of my experience, due to faulty manipulation.

I have spoken concerning this method to a few friends, and among others Dr. Metkoff, of New York. He says he has practiced this method for a year, and he has had no trouble whatsoever. I also have a letter from a son of Dr. Metkoff, in New Haven, in which he states that his experience has been very happy in this respect. He has treated twenty cases since last November. He has not had a single case returned as unsuccessful, and all were painless to a remarkable extent. Those who have practiced this method have been uniformly successful, and it should not be amiss for others to try the experiment.

Dr. F. French. The gentleman tells us he applies cobalt for the destruction of the pulp-tissue in the pulp-chamber. We all know that the essential active principle in cobalt is arsenic. I do not understand how, with cobalt, the pulp in the pulp-chamber can be destroyed, and not that in the nerve-canal.

Dr. M. L. Rhein. I was particularly interested in the careful manner in which the essayist presented this subject, and the caution which he manifested in not unreservedly recommending the use of this method. I believe the history of dentistry shows the method to be an old one. It has been my fortune to see a method very similar to this, with a large percentage of successes and some failures. The only difference in the two methods is that arsenious acid was used instead of cobalt; that is merely a differentiation in the amount of arsenic, because arsenic is always present in the cobalt. I have seen some of these cases successful for years, and others I have seen result in alveolar abscess. In my own mind I have established a reason why they succeed and why they fail, and it rests entirely on the preservative quality of the arsenious acid. I think that is the secret underlying the whole thing. The diagrams which Dr. Bödecker passed around show distinctly the metallic cobalt around the periphery of the canal. We all know that it is the article which is used for the preservation of animals in stuffed form for the various collections that are so commonly seen in the museums. They use arsenic for that purpose, and it keeps them intact for years. We have here a preservative of tissue placed in the pulp, which is absorbed to a certain slight extent down into the roots. I can see no other reason for the astounding fact which Dr. Bödecker has shown. He has been unable to give us any theory why this is so. It is astonishing to all of us; but if the cobalt has preserved the tissue, is it not natural that the dentine under the microscope should show as it would in living dentinal structure? I merely throw this out as a suggestion to be considered in explaining this fact of vital dentine in these teeth treated by the method under consideration.

Dr. Barrett. I want to call Dr. Rhein's attention to one fact: arsenic is not preservative. It is not used for the preservation of stuffed animals. It is used for the purpose of poisoning the insect life with which they might become infested.

Dr. Bödecker. There are several things which I would like to rectify. In the first place, Dr. Andrews called your attention to the question, How do you know whether these teeth are really alive? Under the microscope we can tell, when a tooth immediately after its extraction has been put in alcohol, whether it was alive or dead while in the mouth. If you either grind or slice a softened tooth, mount it, and bring it under the microscope under about a five-hundred power, in living dentine the dentinal fibers appear almost smooth, although they contain a few enlarged interspaces. This you do not observe in dead teeth. In dead teeth the contents of the dentinal canaliculi are broken out, some at greater, others at less intervals. Dr. Hodson and I have been studying that specimen very carefully, and not only this, but seven or eight others; and we were unable, except in a narrow zone where the cobalt had been placed, to observe any dead dentinal tissue.

Dr. W. Jarvie. What do you mean by dead? Do you mean decomposed?

Dr. Bödecker. Dentinal fibers in a beaded condition, and of course decomposed. That proves just what Dr. Andrews cannot understand, and what Dr. Rhein cannot understand, and just the same thing I could not understand myself until about six months ago, namely: that this small portion of pulp, together with the periosteum nourished by the extremely delicate net-work, communicates from one dentinal fiber to the other, and pervades the whole dentine; and not only the dentine, but the enamel at certain places.

Dr. Rhein is mistaken when he thinks that this cobalt has been carried through, because the cobalt has not been placed down as deep as this, and would be unable to follow through the dentinal canaliculi and through the net-work. In this portion of the root you see the enlargement of the dentinal canaliculi [illustrating]. Here you see how the metallic particles of the tin had been carried away, and you also see that the pulp has not been in the condition that it was when the tooth was capped. Secondary dentine has been found later on. There has been a plastic pericementosis since the time of capping the pulp, which is shown down to the apex of the root. In secondary dentine, in pulpitis, etc., which I studied for five or six years, and mounted and experimented with many hundreds of pulps, I found that secondary dentinal formations generally are only visible in the pulp-chamber proper, provided the pulp is not rotted any farther than the pulp-chamber. Of course in such cases as erosion you can trace dentinal formations into the canal, but in the cases of perfect teeth, such as these were, I have never been able to observe secondary dentinal formations of that class and of that character in the roots of the teeth; therefore it is my belief that these secondary dentinal formations were the result of a chronic plastic pulpitis after the introduction of the tin cap.

In regard to the method, I want to explain certain things. In amputating the pulp, care must be taken not to cut through to the bifurcation of the roots. Herbst taught me that many of his failures resulted from cutting too near the bifurcation and then applying the tin cap. He also told me that he had the best results when he filled with tin or gold right away by the rotation method. I have had comparatively little experience in this matter, but I believe that this method is too valuable to throw away, even if you use it in nothing else than in those cases in which you cannot satisfactorily get at the canals.

Dr. A. Westlake. How long is the cobalt kept in?

Dr. Bödecker. From one to two days.

Dr. Westlake. Does the temperament of the patient or the structure of the tooth make any difference?

Dr. Bödecker. I don't know. At the American Dental Association, about eight years ago, I read a paper in which I gave the results of my experiments with arsenious acid for about eighteen months upon dogs, rabbits, and human teeth, and I found that we cannot lay down any rule whatsoever in regard to the action of arsenious acid. It will act one way in one instance, and in the same mouth under the same conditions entirely different the next time. Why and how, I have been unable to say. At one time I had living with me a medical man, Dr. Waldstein. He experimented with other kinds of medicines in the same animals, and at the same time used arsenic, and both of us were utterly perplexed regarding the action of arsenious acid. As has been mentioned before, this cobalt is largely metallic arsenic. It is practically arsenious acid in a milder form.

Dr. S. E. McDougall. In drilling out the pulp, is there not a hemorrhage?

Dr. Bödecker. Yes.

Dr. McDougall. How do you overcome it?

Dr. Bödecker. By applying mercuric chloride, 1 to 1000, until the bleeding stops. It is a wonder that the pulp is not more sensitive than it generally is, but the sensitiveness is very slight.

Dr. George Evans. Is a pulp that is treated with cobalt destroyed, or is it left in a semi-vital condition? If it is totally destroyed, I cannot understand how there is any circulation in it.

Dr. Bödecker. It is not destroyed.

Dr. Evans. How can you apply cobalt, that contains arsenic, and gauge it so accurately that you destroy one section of the tooth and not the other?

Dr. Bödecker. You cannot gauge it.

Subject passed.

(To be continued.)

AMERICAN DENTAL ASSOCIATION.

(Continued from page 755.)

FIRST DAY—*Evening Session.*

THE association was called to order at 8.10, President Walker in the chair.

Section VII, Anatomy, Pathology, and Surgery, was called, and Dr. T. W. Brophy, the chairman, read the report, cataloguing the works which have been published during the year on the subjects embraced with the Section, and also the journal articles of the same character, and giving the titles of papers to be read under the Section by Drs. Cravens, Thompson, and Barrett.

Dr. J. E. Cravens, Indianapolis, Ind., read his paper, which was entitled "A Case of Pyorrhea Alveolaris." An abstract follows:

The patient was a man of fifty years, robust, and apparently in good health. The gums generally were red and angry-looking, bleeding easily and freely; expressed considerable pus from about the anterior eight teeth of each jaw, the festoons between which were swollen and of a violet color; "pockets" on the approximal faces of the pus-discharging cases. Treatment was begun on the 18th of July with the removal of the incrustations and trimming of the margins affected as far as possible, the pockets being washed out with hot water and carefully treated with dilute sulphuric acid (1–10). Pulverized sulphur as a dentifrice, morning and night, was directed, and the use of soap and other alkalies in the mouth prohibited. After three days' daily treatment, but little improvement being manifest, the dilute sulphuric acid was substituted by a ten per cent. solution of nitrate of silver, the washing with hot water being continued. No caustic action and no pain from the lunar caustic solution was observed. The next day no pus could be expressed except from between the lower centrals and right inferior cuspid, and from between and around the right superior cuspid and lateral, which were the seats of the deeper pockets. Again washed out and treated with nitrate of silver. On the 25th congestion was gone, except slight violet tint over roots of inferior centrals, right inferior cuspid, and right superior lateral incisor, with only slight evidences of pus from these localities. Treated as before. On the 26th no pus, except a minute quantity from one side of the right superior lateral incisor. Gum completely free from swelling. Again washed and treated. The next day no pus at any point; gums apparently healthy, and patient reported entire comfort. Again washed and treated as before. On the 29th, no pus; "pockets" evidently filling up by adhesions. Again washed out with hot water, and treated with the nitrate-of-silver solution.

The writer noted that the nitrate of silver caused a slight brownish discoloration about the necks of the teeth treated, but it exhibited no caustic action whatever. He thought its astringent and antiseptic effects were emphasized by the thorough washing out of the pockets with hot water at each sitting, and he believed that the preliminary use of dilute sulphuric acid aided in removing small particles of calcareous matter from the pockets and stimulated granulation. The case appeared to be cured, and in an incredibly short time, though it would be under observation for some weeks.

Dr. W. C. Barrett, Buffalo, N. Y. No disease within the province of dentistry calls for so great thought and reflection as pyorrhea alveolaris. Its etiology has never been fully comprehended, or at least expressed. Remedies have been prescribed, which are always successful in papers and in practice almost always failures. At least that has been his experience, and also of those with whom he has talked. If pyorrhea is a constitutional disorder, then mere local treatment is of no value. If it is merely a local disease, then local treatment should suffice for all ordinary cases. He has never found that local treatment would suffice in every case. In many cases topical remedies merely palliated the difficulty. What is wanted is something to eradicate the disease. By the exhibition of remedies he has been able to check the disease, but in six months or a year the patient will return with a new manifestation of it. That has been the almost invariable rule in the cases of that kind which he has attempted to treat. The remedy proposed in the paper is a cauterant. He knows of no therapeutic measure that seems to have value except to cauterize the tissues affected. Dr. Cravens's statements would indicate that the case described was a local manifestation and nothing else. It was only treated last month. Will it not return in three or six months? If it is simply a local manifestation of a constitutional disorder, there will be a return; but it would be interesting to know whether it has only been checked for the time being, and that is the speaker's opinion. He would like to hear from others whether in such cases there is not a return of the disease with exaggerated force and virulency.

Dr. M. L. Rhein, New York, N. Y., would concede some of the points made by the last speaker, and others he would not agree to. From hearing the paper read he should have thought it was not a case of pure pyorrhea, as distinguished from the false variety which results from bad hygienic management. One fault in these cases was often bad diagnosis. At the start it should be settled always whether the patient is in bad or good health, and this can only be done by thorough examination by a physician. Assuming that the patient was in health, he believes there was no pyorrhea in this case. As to the etiology of pyorrhea alveolaris, it is pretty fully established in his mind and in the minds of many other practitioners that the disease recognized as pyorrhea alveolaris is either a sequence of some constitutional disorder, or an indication that that constitutional disorder is present at the time; in other words, there is faulty nutrition. If the constitutional disease is curable, he can give a favorable prognosis of the pyorrhea; if it is a sequence that is curable, he can give a more favorable prognosis. One special point should be to distinguish between the common form of what is sometimes called pyorrhea, resulting from a badly-kept mouth, and that which is a sequence of a constitutional disturbance. If we cannot determine this by ourselves, we can by consultation with a physician as to the condition of the patient. Many persons with this trouble have passed through his hands that never have been cured, and to whom he never promised a cure because he knew the case was hopeless, as where there was tuberculosis. Where he finds this in such grave form that the physician knows it to be incurable, it is useless to give a favorable prognosis.

Dr. W. H. Morgan, Nashville, Tenn. As to the etiology of pyorrhea alveolaris, observation more than any theory had convinced him that the disease was constitutional, and in a large majority of cases inherited. Every case can be cured: Just remove the teeth, and nature will do the rest. He did not know it was ever cured except by the removal of the teeth.

Dr. A. W. Harlan, Chicago, Ill. The subject under discussion is the treatment of a single case, and not the etiology of the disorder or a multitude of remedies for it. There is no objection to the use of dilute sulphuric acid as a preliminary step, because it contains 13 per cent. of the acid to 87 per cent. of water, and is then diluted ten times, so that when brought in contact with the soft tissues it does no damage. Nitrate of silver is an excellent remedy, and has been used for many years, but not in so concentrated a form as described by Dr. Cravens. It would be a powerful astringent, and the reason why it would check the flow of pus and close the pockets would be because of its astringent and stimulating effects. To say that the case was cured after eleven days' treatment is hardly credible, because it would be almost impossible, if one-half the depth of the roots was involved, for the tissue to be reproduced in that time. The use of hot water is an excellent idea,—in a great many cases better than many other agents which are used. Dentists fail to utilize hot water as a therapeutic agent as much as they should, and Dr. Cravens has made a good point in calling attention to it for producing an effect on the gums. The speaker dilutes sulphuric acid with cinnamon water because he believes he gets a better effect than when he uses ordinary hydrant water.

Dr. Cravens. Dr. Barrett misunderstood the statement of the paper as to the effect of nitrate-of-silver solution. He had stated in the paper that he could observe no caustic effect. He could not agree with Dr. Rhein as to the constitutional origin of the trouble. Dr. Evans, of Paris, had seen so many cases of the disease associated with affections of the kidneys that he thought it was likely to be recognized as a manifestation of kidney-trouble. It is also recognized on the other side of the ocean as a manifestation of gout. As to whether the case described in the paper was cured, he had simply expressed his opinion that it was cured.

(To be continued.)

SOUTHERN DENTAL ASSOCIATION.

(Continued from page 760.)

FIRST DAY—*Afternoon Session* (Continued).

PRESIDENT WHITE in the chair.

The Committee on Education was called, and Dr. B. Holly Smith read a paper, of which an abstract follows:

Dr. Smith's paper was entitled, "Dental Education and Examining Boards." After adverting to the laws established in various states, by which it was intended that imperfectly prepared candidates should be excluded from the profession, the paper continued: In the work of dental education, as in the work of education of any sort, there must be live centers of influence and adequate sources of instruction, rallying points of all those who are interested in the preservation and advancement of the standard of acquirements and training. It is easy to trace the influence and power of such institutions, and to show that the history of progress itself has been the history of some famous college. The character and extent of the influence and power of the dental colleges must not be undervalued. While there are individual instances of success without the assistance of the schools, as a general proposition any future practitioner should enter the profession through the door of a reputable and established college. The position and work of the colleges are the bulwark and defense of dental education.

The position of the examining boards is a direct outgrowth of law. The law, as such, has nothing to do with the betterment of instruction, but is the exercise of a police power by the state for the protection of its citizens, and it is a source of pride and congratulation to the profession at large that the execution of the law has been intrusted to most competent and efficient boards of examiners, who have thoroughly and conscientiously discharged their duty to the state and to the profession. While all are conscious of the debt of gratitude owed to the boards, the existence is recognized of some slight inharmony among the elements which should work together for the good of all,—the citizens or patients, the profession, the colleges, and the students.

In the selection of a test to adequately establish the facts of ability and skill, the power of examining boards is entirely discretionary, and its exercise may become perfunctory or prohibitory. The standard itself must necessarily be shifting and arbitrary, and it is not to be supposed that examinations alone, however able and experienced the examiners, can establish, in a few hours, the fitness *vel non* of the candidate, not only on account of the possible inadequacy or unfitness of the selected standard, but also because of the personal elements of the equation, as, for instance, the inability of the candidate at times to discuss theoretically what he understands practically. Thus, while the defense established by the states for the protection of their citizens in examining boards is good, it is not the best. If the necessarily brief and incomplete test which an examining board can give is efficient and satisfactory, one extending over years and covering every variety of instruction and practice must be better. Hence it is not in derogation of the dignity and efficiency of state boards that a diploma from a competent faculty, granted after three years of faithful study and student practice, should have a preponderating weight in the establishment of a candidate's fitness to practice. The only ground upon which such a conclusion can be impugned is the incompetence or dishonesty of the faculty granting the diploma, a suggestion not likely to find lodgment in fair and honorable minds. The claim in behalf of reputable dental colleges, then, is that their diploma should have a due, if not a controlling, weight with examining boards. One fact which should go far toward establishing the reputability of a college would be the extension of its course to three years of work. The colleges also can certainly ask the support and recognition of the profession, because of their influence and effect in extending the sphere of dental education. How can we expect the American diploma to be honored in Europe when it is not properly estimated in our own country? In medicine the examining boards of several states are beginning to recognize one another, and the step from this to the recognition of the diplomas of reputable colleges is short and easy.

The profession rightfully claims from the colleges an adequate and thorough course of instruction, competent and scholarly instructors, and honorable, conscientious labor. The colleges are the legitimate ports of entry to the profession, and the preparation they give must needs be thorough and sufficient; and the pledge of the colleges to the profession to eliminate the immature and unadapted from the ranks of those seeking entry into dentistry is not to be regarded slightly, or to be disregarded by considerations of personal favor, private gain, or mistaken kindness. Any college not measuring up to the responsibility imposed by the pledge deserves the censure and enmity of the profession.

From any theoretical aspect of the case, the duty and responsibility of the colleges must of necessity be higher and greater than those of the examining board. The former undertake to prepare students for dentistry; the latter to exclude, not prepare, in which they are essentially state officers, incidentally guarding the profession while protecting the public at large.

Their work for the advancement of the profession is, however, none the less distinguished because indirect and incidental.

The student, also, has claims which cannot be denied. We require from him ability, adaptability, and adequate preparation. While the exclusion of the incapable, the immature, and the ignorant is an uncontested duty, it is just as much a matter of conscience, of duty, and of right to make sure that neither through pedantic blundering nor honest errors of judgment are the capable, the earnest, the zealous, the ardent, the enthusiastic, the prepared, excluded. The student cannot settle the question of right and wrong between the examining board and the college. He may see the holder of a college diploma, won after a regular course of instruction, plucked by the examining board. This to one intending to enter dentistry is not likely to encourage a sufficient, prolonged, and thorough course of study. Undervaluation of systematic training cannot but open the door to irregularities in preparation, and a consequent lowering of grade in requirements, skill, and science.

As a means of harmonizing the differences existing, by which the college diploma granted after systematic preparation at a reputable college shall have its due weight accorded, and that the services of the boards shall be recognized, the writer submitted the following proposition: "At the termination of their three years' course, let all candidates for graduation from colleges of dental surgery undergo an examination at the hands of the examining board of that state in which the college is located. Let this examination be as severe as the board may choose to make it,—the colleges are competent and willing to meet the test,—but in the name and interest of the student let him feel that when he has graduated he has earned the right to go forward in his profession, there to learn, in meeting the daily practical exigencies of his work, more than either colleges or boards can teach him, there to develop his individuality, there to become an ornament and an honor to his profession. Let not the idea of examination after examination hang over his head, each more threatening than the last, giving him the notion that entry into his work depends not so much upon faithful study and adequate preparation, as upon an uncertain kind of ability to do well these mental gymnastics miscalled examinations.''

Dr. E. S. Chisholm, Tuscaloosa, Ala., had been connected with the board work in his state since 1881. In that time many applicants for license to practice who were college graduates had come before the board. Many of them were excellently prepared for the work; some were poorly prepared. In the early days of his service men had come before the board with diplomas in their hands who said that they had not filled three teeth during their studentship, and they knew nothing of prosthetic dentistry. That condition is now very much improved. Young men who come up nowadays are competent in all subjects, as a rule. Now and then there is one who may be deficient in some particular branch, but from the improvement which had been seen he hoped the time would come when state boards would recognize diplomas as carrying the assurance of qualification to practice. In our board work we have tried to build up and strengthen the colleges. At first there were many applicants entirely without qualification, and the effort has been to induce such men to become qualified. One instance he recalled was that of a young man who was examined three times before he passed, but then he passed a very creditable examination, and he said that the board had made a man of him.

Dr. W. G. Browne, Atlanta, Ga., could not see why there should be that clash of interests between examining boards and the colleges which became apparent every once in a while. So far as the boards were known to him, they were the best kind of instruments to uplift dental education. They had been the means of stimulating colleges to better work. He knew of examining boards reporting students who had come before them as being deficient in certain lines, with the result that they went to work on these lines, and the next time they came before the board they were perfectly prepared.

Dr. G. F. S. Wright, Columbia, S. C., read a resolution adopted at the late meeting of the South Carolina State Dental Association, indorsing those colleges which have adopted the three years' requirements for students, and recommending intending students to that class of colleges.

Dr. V. E. Turner, Raleigh, N. C., said he recognized the difficulty expressed by Dr. Smith in his paper in harmonizing the differences between the examining boards and the colleges, but the trouble arose at the time the laws were passed, and we must not shirk our duty because the law requires these things. The proposition that students after passing the examining board of the state in which the college from which they came is located should be admitted to practice in all other states is impracticable, because it is not in harmony with the laws of the states. For his part, he could not see that there was much wrong in examining boards as at present constituted, nor in their work. From personal experience he knew that if a candidate was found not to be up in some particular subject it was the custom of the board to go into a more elaborate examination on that point, in order to give him a chance to show what he did know in other matters of that character. A student fresh from college ought to be able to pass any examination likely to be offered him by a state board without difficulty, unless there was some defect in his education. He did not make charges against the colleges,—far from it,—but he thought there might be some oversight in particular cases.

Dr. J. N. Jones, Jacksonville, Fla., agreed with the paper in many things. He thought that there should of course be a check against the colleges somewhere, but when a student has taken three courses in a college he should be able to practice anywhere, and our system of legislation should be so uniform that when a candidate passes one state board his examination will be recognized by all. There is too much red tape about this examination business. In Florida a dentist cannot obtain a license to practice until he has a college diploma. They had been forced to this measure. The state had become a sort of dumping-ground for all the others. Dentists from all parts who were not allowed to practice in their own states would come to Florida to set up business, and therefore the legislature was asked for a law which should require the possession of a diploma as a preliminary to entering upon practice in Florida. This had done much good, no doubt ; but if some uniform plan of legislation and examination could be devised, he for one would be willing to forego the advantages of the present law.

Dr. R. C. Young, Anniston, Ala. The adoption of the three-years' term by the colleges was brought about by the aid of the state boards, and the advance of the colleges to that standard was certainly one of the most gigantic strides in the history of dental education. The time is now ripe when the dental colleges should cease to accept as matriculates young men who are not adapted by previous education to the study and practice of dentistry. We have been called a learned profession, but we have not been worthy of the name. In his opinion, the examining boards of the various states are the bulwarks of advancement, and as the colleges progress to perfection in their methods the examining boards will become less and less necessary, until finally they will only exist in name. His personal experience with the board of his state was that their examination was rigid, but it was sensible and practical, and no more severe than a qualified man should be willing to face. He believed that they had some of the best dental timber in the world in Alabama, and they certainly owed it to the state examining board that this was so.

Adjourned to 8 o'clock P.M.

Evening Session.

The association was called to order at 8.12 P.M., President White in the chair.

The discussion of Dr. B. Holly Smith's paper was resumed.

Dr. Smith expressed a wish to put some of the speakers right with reference to a false impression which appeared to have been made by his paper. That was that he had shown some opposition to examining boards. He certainly had no such intention, and he thought he had made himself clear on that point. He had attempted to trace the origin of examining boards and establish their relation to the profession. Dr. Young, of Alabama, had spoken of the difficult examination he had to pass before the examining board of that state. As a teacher in a school, he himself would prefer that this board, which has been held up here as so rigid in its examinations, should take his class after they had been under his teaching for three years, and examine them to find out whether they were qualified to receive their diplomas, and have them plucked then, than after being with them for three years, and trying as best he knew how to establish correct principles of practice in their minds, to send them out only to find them thrown by an examining board. To him there was no more painful experience than that of examination time. If he has worked with a man for three years, he doesn't need any examination to find out the extent of the man's knowledge. He partook somewhat of the feelings of the candidate at this time. It often occurs that a man who has done well in his studies and in his clinical work is nervous at examination time. More than once a young man has been thrown at the examinations, who, on being carefully examined, has been found to be well qualified. Place yourself in the position of the student. Examinations do not tell us what these young men know. His proposition was made, perhaps, in a spirit of over-generousness, but he was willing to let the state board say whether the young men who had passed through the college with which he was connected were fit to receive their diplomas. But it was scarcely fair to take a candidate before a state board on some part of anatomy remote from the mouth, and in which the student is not so minutely educated as in those parts which will come under his jurisdiction in actual practice. He was sorry that any one should have been led to think that his paper showed antagonism to state boards, as that was not his intention.

Dr. Chisholm was very much pleased with the paper. The impression having been given that the state board of Alabama was very severe in its examinations, he wished to explain that it was not unnecessarily rigid. They put questions to candidates to demonstrate what the young men knew of the theoretical branches as well as their practical knowledge, but when it comes to a candidate who can't say whether there are bicuspids in the first dentition, or whether an alveolar abscess indicates a dead pulp, and is ignorant of the treatment for such a condition, they consider such a one unqualified to practice dentistry. One candidate, he recalled, was asked what reasons he would find for filling a tooth. His reply was, "Because it couldn't fill itself," showing entire ignorance of what the question meant. Another whose competency was questioned was asked how long it would take a child's tooth which was broken off to grow out again, and he replied about five years. For himself he wished there could be harmony between the state boards and the colleges.

Dr. Jones. Has Dr. Chisholm absolute confidence in the examinations in the state board of Maryland?

Dr. Chisholm replied that he was only representing the state of Alabama; he did not know anything about Maryland.

Dr. Jones desired to make the point that there were too many examining boards, in his opinion.

The subject was passed.

(To be continued.)

SOCIETY OF THE ALUMNI, DEPARTMENT OF DENTISTRY, UNIVERSITY OF PENNSYLVANIA.

THE twelfth annual reunion of the organized alumni of the Department of Dentistry, University of Pennsylvania, took place at Hotel Bellevue, Philadelphia, May 5, 1892, and was presided over by Dr. Benjamin F. Place, Norristown, Pa.

There was a large attendance, members from Delaware, Pennsylvania, New Jersey, New York, and Massachusetts being present. The several features of the reunion were most thoroughly enjoyed, and the utmost good-fellowship and enthusiasm prevailed.

The president, in his inaugural address, dwelt upon the value of the influence that an organized alumni has upon its particular department of the university, and pointed with pride to the fact that the dental alumni of the University of Pennsylvania had by far the most vigorous and efficient organization of all the other departments.

All that is needed is a little more time and energy. It will then have a double influence and power: on the one hand supporting and aiding every advance made by the school in its work of raising the standard of dental education, and on the other encouraging its members to literary and scientific effort.

There is no better way to settle the vexing questions that arise between the profession and college faculties than through alumni organizations, as he felt sure that all colleges were disposed to heed the expressed wishes of their alumni.

Thus the usefulness of an organization such as this could not be measured by surface indications, for as it would grow, and as others of its class would spring up and increase in numbers and power, its field of usefulness would widen proportionately.

He urged members to work hard, to the end that the society be built up both in members and influence, so that the objects in sight might be fully attained.

Papers were read by Drs. C. J. Peters, Syracuse, N. Y., and H. S. Seip, Allentown, Pa., and discussed at considerable length by several of the members.

Among the matters discussed and acted upon favorably was a resolution to hold an adjourned meeting at Chicago next year, and the secretary was directed to correspond with western members regarding the same.

It was also decided, in lieu of the published report of proceedings, to issue a journal to be called *The Alumni Annual*, which shall contain the minutes and proceedings of the meetings, together with other specified matter, a copy of which shall be mailed to each graduate of the Department of Dentistry, University of Pennsylvania.

Twenty new members were nominated and elected, as follows: Johannes Berger, W. E. Christensen, C. W. Crankshaw, H. K. Baer, J. L. Beminghoff, J. H. Kittams, C. H. Barnes, E. H. Skillman, John J. Bowen, E. W. Lapp, F. L. Clark, C. A. Stewart, Edw. Parshall, J. F. Rymer, C. A. Armada, A. L. Brown, F. D. Murto, G. D. Lukens, J. T. Segar, and J. H. Dreher.

The officers for the ensuing year are as follows: Dr. Grafton Munroe, Springfield, Ill., president; Drs. W. F. Rehfuss, Philadelphia, Pa., Solomon Freeman, New York, C. W. Crankshaw, Norristown, Pa., vice-presidents; Dr. W. L. Winner, Philadelphia, Pa., recording secretary and treasurer; Dr. H. B. McFadden, Philadelphia, Pa., corresponding secretary; Dr. B. H. Baker, Wilmington, Del., orator; Drs. Charles A. E. Codman, L. Foster Jack, J. C. Hertz, Ambler Tees, Jr., and B. H. Baker, executive committee.

MISSOURI STATE DENTAL ASSOCIATION.

THE twenty-seventh annual meeting of the Missouri State Dental Association was held at Clinton, Mo., July 5 to 8 inclusive. There were twenty-six new members admitted, and eleven papers read.

The following is the list of officers and committees elected for the ensuing year: J. D. Patterson, Kansas City, president; W. E. Tucker, Springfield, first vice-president; DeCoursey Lindsley, St. Louis, second vice-president; William Conrad, St. Louis, corresponding secretary; H. A. Rubey, Clinton, recording secretary; James A. Price, Weston, treasurer; C. B. Hewitt, Kansas City, A. J. McDonald, Kansas City, J. E. Crozier, Lee's Summit, executive committee; E. E. Shattuck, Kansas City, H. A. Cress, Warrensburg, E. B. Crane, California, board of censors; Frank Slater, Rich Hill, J. B. Newby, St. Louis, C. L. Hungerford, Kansas City, committee on ethics; James A. Price, Weston, committee on law; J. E. Crozier, Lee's Summit, T. J. Frey, Moberly, C. L. Hickman, St. Louis, committee on publication; C. L. Hungerford, Kansas City, committee on new appliances; C. H. Darby, St. Joseph, supervisor of clinics.

The next meeting of this association will be held at Excelsior, Mo., on the first Tuesday after July 4, 1893.

WILLIAM CONRAD, *Corresponding Secretary*, St. Louis, Mo.

TENNESSEE STATE DENTAL ASSOCIATION.

THE twenty-fifth annual session of the Tennessee State Dental Association was held at Lookout Mountain, in conjunction with the meeting of the Southern Dental Association, commencing Tuesday, July 26, 1892. Only routine business was transacted, the State Association directing that all papers prepared for its meeting be turned over to the Southern Association, and its members were resolved into a committee of the whole to entertain visiting dentists.

The following officers were elected for the coming year: S. B. Cook, Chattanooga, president; W. W. Jones, Murfreesboro, first vice-president; W. J. Morrison, Nashville, second vice-president; P. D. Houston, Lewisburg, recording secretary; H. E. Beach, Clarksville, treasurer; D. R. Stubblefield, Nashville, corresponding secretary; A. W. Palmer and J. U. Lee, both of Chattanooga, and T. A. Pope, Franklin, executive committee.

The next meeting will be held at Chattanooga, on the first Tuesday in July, 1893.

MASSACHUSETTS DENTAL SOCIETY.

The twenty-seventh annual meeting of the Massachusetts Dental Society was held at Huntington Hall, Massachusetts Institute of Technology, Boston, Mass., on July 7 and 8, 1892.

The following officers were elected for the ensuing year : Josiah W. Ball, Boston, president ; W. E. Page, Boston, and J. King Knight, Hyde Park, vice-presidents ; Edgar O. Kinsman, Cambridge, secretary ; Edward Page, Charlestown, treasurer ; J. King Knight, Hyde Park, librarian ; George F. Eames, W. E. Boardman, H. S. Draper, and J. H. Daly, all of Boston, and T. W. Clements, of Brookline, executive committee.

A committee, consisting of Edgar O. Kinsman, secretary, D. B. Ingalls, S. G. Stevens, and J. W. Bailey, reported resolutions, which were passed, of respect to the memory of Dr. Horatio Leseur, of Boston, reciting "appreciation of his long service and genial disposition,—a man and a gentleman deceased at a mature age, who leaves upon the memory of those with whom he has associated an incentive to be helpful to all around them."

The same committee also reported resolutions, which were passed, of respect to the memory of the late Dr. O. F. Harris, of Worcester, "whom the hand of Divine Providence has removed from our midst after a life of usefulness and honor. We place upon our records our appreciation of the wisdom and skill of the deceased."

EDGAR O. KINSMAN, *Secretary.*

GEORGIA STATE DENTAL SOCIETY.

The regular annual meeting of the Georgia State Dental Society was held at Rome, Ga., July 19–24, 1892.

The officers elected for the ensuing year are as follows : S. M. Roach, president ; N. A. Williams, first vice-president ; R. A. Holliday, second vice-president ; H. A. Lowrance, treasurer ; S. H. McKee, recording secretary ; L. D. Carpenter, corresponding secretary ; J. H. Coyle, G. W. McElhaney, W. C. Wardlaw, A. G. Bouton, and D. D. Atkinson, examining board ; T. N. Wells, O. H. McDonald, C. V. Rosser, B. F. Simms, and T. P. Hinman, executive committee.

The next place of meeting will be at Atlanta, Tuesday, May 9, 1893.

L. D. CARPENTER, *Corresponding Secretary*, Atlanta, Ga.

AMERICAN DENTAL SOCIETY OF EUROPE.

The eighteenth annual meeting of the American Dental Society of Europe was held at Basel, Switzerland, August 1, 2, and 3, 1892.

The following officers were elected : Dr. L. C. Bryan, Basel, president ; Dr. J. H. Spaulding, Paris, vice-president ; Dr. Charles J. Monk, Wiesbaden, treasurer ; Dr. Chas. W. Jenkins, Zurich, secretary.

On account of the large number of members who intend to visit Chicago next summer, the next meeting was appointed for August, 1894, to be held at Geneva.

CHARLES W. JENKINS, *Secretary.*

NEW BRUNSWICK DENTAL SOCIETY.

The third annual meeting of the New Brunswick Dental Society was held in the city of Moncton, N. B., August 9, 1892.

The following officers were elected for the ensuing year: James M. Magee, St. John, N. B., president; Charles W. Bradley, Moncton, N. B., vice-president; E. P. Doherty, Moncton, N. B., secretary and treasurer.

The council of the society held its annual meeting on the morning of the same date. There was no change made in the officers, Dr. C. A. Murray, of Moncton, being re-elected to the presidency, and Dr. Frank A. Godsoe will discharge the duties of secretary and registrar of the council. The next meeting of both society and council will be held in St. John, N. B., on the second Tuesday in August, 1893.

FRANK A. GODSOE, *Secretary and Registrar.*

INDIANA STATE DENTAL ASSOCIATION.

The thirty-fourth annual meeting of the Indiana State Dental Association was held at Lake Maxinkukee, Ind., June 28 to 30, 1892.

The following officers were elected for the ensuing year: R. W. Van Valzah, president; W. M. Hindman, vice-president; G. E. Hunt, secretary; R. I. Oliver, treasurer.

The next meeting will be held at Indianapolis, on the last Tuesday in June, 1893.

G. E. HUNT, *Secretary*,
143 North Penn street, Indianapolis.

CALIFORNIA STATE DENTAL ASSOCIATION.

At the twenty-third meeting of the California State Dental Association, held in San Francisco, July 19 to 22, 1892, the following officers were elected for the ensuing year:

W. Z. King, San Francisco, president; L. A. Teague, San Francisco, first vice-president; I. W. Hayes, Grass Valley, second vice-president; J. P. Parker, Santa Cruz, third vice-president; L. Van Orden, San Francisco, recording secretary; C. E. Post, San Francisco, corresponding secretary; and T. N. Inglehart, San Francisco, treasurer.

CHAS. E. POST, *Cor. Sec.*,
302 Stockton street.

PENNSYLVANIA STATE DENTAL SOCIETY.

At a meeting of the Pennsylvania State Dental Society, held at Cresson, Pa., July 20, 1892, the following-named officers were elected for the ensuing year:

W. E. Van Orsdel, Sharon, president; F. L. Bassett, Philadelphia, first vice-president; W. B. Miller, Altoona, second vice-president; C. V. Kratzer, Reading, recording and corresponding secretary; and H. N. Young, Wilkes-Barre, treasurer. F. L. Bassett, Girard Building, Philadelphia, chairman; L. Ashley Faught, C. S. Beck, J. A. Libbey, and G. W. Green, executive committee.

NEW JERSEY STATE DENTAL SOCIETY.

At a meeting of the New Jersey State Dental Society, held at Newark, N. J., July 20, 1892, the following officers were elected for the ensuing year:

Oscar Adelberg, Elizabeth, president; E. M. Beesley, Belvidere, vice-president; Charles A. Meeker, Newark, secretary; and George C. Brown, Elizabeth, treasurer. E. M. Beesley, Belvidere, chairman; S. C. G. Watkins, Mont Clair; C. W. F. Holbrook, Newark; R. M. Sanger, East Orange, and Harvey Iredell, New Brunswick, executive committee.

NEBRASKA STATE DENTAL SOCIETY.

At the annual meeting of the Nebraska State Dental Society, the following officers were elected for the ensuing year: F. N. Conner, Omaha, president; T. F. Skeede, Seward, vice-president; W. C. Davis, Lincoln, recording secretary; D. P. Simms, Lincoln, corresponding secretary; and J. A. Dieffenbacher, York, treasurer.

DENTAL COLLEGE COMMENCEMENTS.

UNIVERSITY OF MICHIGAN—COLLEGE OF DENTAL SURGERY.

The annual commencement exercises of the College of Dental Surgery of the University of Michigan were held, in connection with those of the other departments of the university, at Ann Arbor, Mich., on Thursday, June 30, 1892.

The commencement oration was delivered by Justin Winsor, LL.D.

The degree of D.D.S. was conferred upon the following thirty-nine graduates:

Burt Abell.
Samuel H. Arthur.
Harry H. Avery.
Harry P. Ball.
Walter J. Bell.
Charles L. Blunt.
Herbert W. Bovee.
Charles E. Burchfield.
Charles S. Chadwick.
Timothy S. Childs.
Thos. Coleman, D.D.S.
Eli M. Conard.
Oscar W. Daly, D.D.S.
Archibald W. Diack.
George Dilworth.
Elmer C. Goldthorp.
Allison W. Haidle.
Charles W. Hall.
Henry J. Harvey.
Thomas E. Howson.
Osgood F. Ingalls.
Vida Annette Latham.
Ben. H. Lee.
Frank P. Martin.
Jas A. Milliken, D.D.S.
Henry Milling.
John A. Moore.
William J. Mummery.
Wm E. Prather, D.D.S.
Frank S. Prettyman.
Ellen D. Searle.
Edward D. Slawson.
Joseph A. Snyder.
Edward B. Spalding.
Carrie M. Stewart.
George E. Tribby.
Anthony Van Kammen.
Austin S. Watrous.
May Werton.

BOSTON DENTAL COLLEGE.

The twenty-fifth annual commencement exercises of the Boston Dental College were held at Berkeley Temple, Boston, Mass., on Wednesday, June 15, 1892, at 7.30 P.M.

The annual address was delivered by B. S. Ladd, Esq., and the valedictory address by Ellsworth N. Brown, D.D.S.

The number of matriculates for the session was one hundred and five.

The degree of D.D.S. was conferred on the following graduates by I. J. Wetherbee, D.D.S., president of the college:

John C. F. Bridge.
Karl S. Brock.
Ellsworth N. Brown.
Richard B. Callaway.
Thomas P. Cahill.
Stephen H. Chase.
Pearl R. Copeland.
Thomas F. Cuff.
William V. Davies.
Albert J. Derby.
William H. Duddy.
Walter L. Dunton.
Arthur E. Estebrook.
James A. Ewing.
John W. Forbes.
Guy N. Gammon.
Daniel Griffen.
William I. Hervey.
Moses Jessurun.
George N. Johnson.
Philip P. Kelley.
Albert H. Ketcham.
John S. King.
Irving M. Luce.
John F. Maloney.
William R. Marsh.
Frank R. Mayers.
Norry Miett.
Louis D. Millett.
William S. Pearman.
Charles N. Piper.
Edwin A. Quinn.
Frederick A. Robinson.
Julius Stahl.
William P. Swasey.
George L. True.
John E. Walsh.
Clarence P. Whittle.

Harvard University—Dental Department.

The annual commencement exercises of the Dental School of Harvard University were held, in connection with those of the other schools of the university, in Sanders Hall, Cambridge, Mass., on Wednesday, June 29, 1892.

The number of matriculates for the session was forty-nine.

The degree of D.M.D. (*Dentariæ Medicinæ Doctor*) was conferred on the following graduates by Charles William Eliot, LL.D., president of the university:

Edward S. Bryant.
Allen S. Burnham.
Charles E. B. Chase.
Willard E. Curtice.
K. A. Davenport, D.D.S.
Ernest F. Gabell.
Theodore Hallett.
Herbert F. Hill.
Albert E. Hulme.
Richard C. Moritz.
Henry S. Parsons.
Henry R. Peach.
Henry E. Rose.
Nathan P. Wyllie.

Louisville College of Dentistry.

The annual commencement exercises of the Louisville College of Dentistry (Dental Department of the Central University of Kentucky) took place at Macauley's Theater, Louisville, Ky., on Tuesday evening, June 21, 1892.

The announcement of the curriculum was made by Dr. J. L. Howe, dean, and the valedictory address on behalf of the class was delivered by John L. Jewett, D.D.S.

The degree of D.D.S. was conferred on the graduates by Dr. Blanton, chancellor of the university.

University of Minnesota—Dental Department.

The annual commencement exercises of the Dental Department of the University of Minnesota were held, in connection with those of the other departments of the university, at Minneapolis, Minn., on Thursday, June 2, 1892.

An address was delivered by President Cyrus Northrop, LL.D., who conferred the degree of D.D.S. on the following graduates: Frank W. Force, Miland A. Knapp, James W. Paul, and Thomas F. Williams, all of the state of Minnesota.

DENTAL SOCIETY ANNOUNCEMENTS.

COMMITTEE ON ESSAYS (NO. 17) OF THE WORLD'S COLUMBIAN DENTAL CONGRESS.

PRELIMINARY NOTICE.

It is the aim of the World's Columbian Exposition "to gather together evidences of the material progress, achievement, and civilization of the world, and so arrange them that every department of human endeavor may be studied and examined through all its various grades of development." In recognition of the important part which the growth and professional development of dental science and art have contributed to the world's progress, the holding of a "World's Columbian Dental Congress" under the auspices of the World's Congress Auxiliary has been provided for by a duly authorized General Executive Committee, appointed by the dental profession of America through its two governing dental organizations. The undersigned committee, being intrusted through authority of the General Executive Committee with the duty of soliciting essays appropriate to the "Division of Dental and Oral Surgery," and realizing the necessity and great importance of a proper presentment of the literary and scientific phases of our profession through the contributions of its representative men, respectfully invite the preparation of papers directly or collaterally connected with the above-named department, to be submitted to this committee at least three months previous to the convening of the congress, the date of which will be August 17, 1893. All essays must be in the hands of the committee at the time requested, in order that opportunity shall be afforded for their arrangement and assignment to appropriate Sections. Those contributions earliest received will, of course, take precedence. The committee especially desires that answers to this request, including the titles of papers, shall be forwarded to the chairman at as early a date as possible. The authors of those papers which are accepted by the committee for a place upon the program will be notified of the fact as promptly as possible. Information respecting the special prize essay on Oral Hygiene may be obtained from the chairman of the Committee on Prize Essay (No. 23), Dr. Theodore Stanley, Kansas City, Mo.; information respecting essays in general from the chairman of the Committee on Essays (No. 17). Forward all communications to the chairman of the Committee on Essays, Lock Box 1615, Philadelphia, Pa.

DR. EDWARD C. KIRK, *Chairman*, *Philadelphia*, *Pa.*
DR. J. W. WASSALL, *Chicago*, *Ill.*
DR. A. H. THOMPSON, *Topeka*, *Kas.*
DR. H. H. JOHNSON, *Atlanta*, *Ga.*
DR. L. G. NOEL, *Nashville*, *Tenn.*
DR. C. NEWLIN PEIRCE, *Philadelphia*, *Pa.*

NORTHERN ILLINOIS DENTAL SOCIETY.

The Northern Illinois Dental Society will hold a two-days' session at Rockford, Ill., on Wednesday and Thursday, October 26 and 27, 1892. Members of the profession are cordially invited to attend.

JAMES W. CORMANY, *Secretary*, Mt. Carroll, Ill.

FIFTH DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

THE twenty-fourth semi-annual meeting of the Fifth District Dental Society of the State of New York will be held at Syracuse, on Tuesday and Wednesday, October 11 and 12, 1892.

Papers will be read by Drs. H. H. Tompkins, I. W. Parry, W. I. Southerton, A. R. Cooke, R. F. Jones, and I. C. Curtis.

The Board of Censors will be in attendance to examine candidates for admission to the society. Applications for membership should be made to the chairman of the board on or before the day of meeting.

Accommodations at special rates have been secured at The Yates. Members of the profession are invited to be present.

A. A. STILLMAN, *Secretary*, Syracuse, N. Y.

AMERICAN ACADEMY OF DENTAL SCIENCE.

THE twenty-fifth annual meeting of the American Academy of Dental Science will be held in Boston on Wednesday, November 16, 1892. The annual address will be delivered by Dr. A. W. Harlan, of Chicago.

As this will be the twenty-fifth anniversary of the academy, a full attendance of members (active, associate, and honorary) is particularly requested.

E. N. HARRIS, *Corresponding Secretary*,
248 Boylston street, Boston, Mass.

NEW ENGLAND DENTAL SOCIETY.

THE thirtieth annual meeting of the New England Dental Society will be held in the lecture-room of the Natural History Society building, corner of Berkeley and Boylston streets, Boston, Mass., Thursday, October 6; and Friday, October 7, at the Boston Dental College.

EDGAR O. KINSMAN, D.D.S., *Secretary*,
Cambridge, Mass.

EDITORIAL.

THE WORLD'S COLUMBIAN DENTAL CONGRESS.

IN publishing the following address of the Committee on a Dental Congress under the World's Congress Auxiliary of the World's Columbian Exposition, we again call attention to the importance of this great dental meeting to be held at Chicago in August, 1893. The work of the twenty-five or more committees to whom has been intrusted the carrying out of the details of the plan of organization has been actively pushed forward during the past few months, until progress in all departments is such that no doubt can now be entertained of the final complete success of the enterprise. The interest and enthusiasm manifested in relation to the congress have passed beyond our national geographical limits, and expressions are being daily received from all parts of the globe in the kind and in degree which give assurance that the ambition of the committee will be fully realized,—viz, to make this the most notable gathering of dentists, the greatest meeting in point of excellence of material in all departments of our profession, that has ever occurred in its history. Most gratifying reports from all parts of Europe have been received, and promises of a large foreign representation are made. We are sorry to learn that the British Dental Association failed to carry a motion to hold an adjourned meeting at Chicago during the congress. The motion was lost, so we are informed, on the ground that a regular meeting of the association could not legally be held outside of Great Britain. But though this eminent association will not be able to be present as a body, ample assurance has been given that it will be largely represented by its delegates and individual members. The same is also true of the principal dental organizations of France and Germany.

We publish elsewhere in this issue the official preliminary announcement of the Committee on Essays (No. 17), calling for essays to be read before the congress. On no one feature perhaps does the character and success of the meeting depend more than upon the value and interest embraced in its literary and scientific work. When it is realized that the presentment there to be made will be before an audience including the best element in dentistry, representing the entire world, the character of the essays should be in accordance with that fact, and of an order which shall harmonize with the high ideal manifested in the plan and scope of the congress.

We shall keep our readers fully informed as to the future developments of the affairs of this meeting.

THE WORLD'S CONGRESS AUXILIARY OF THE WORLD'S COLUMBIAN EXPOSITION.

Department of Medicine.—General Division of Dental and Oral Surgery.

PRELIMINARY ADDRESS OF THE COMMITTEE ON A DENTAL CONGRESS.

It is the aim of the World's Columbian Exposition to gather together the evidences of the material progress and achievement of the civilization of the world, and so arrange them that every department of human endeavor may be studied and examined through all its various grades of development.

It is also their desire to represent the intellectual and scientific development and achievement of the entire civilized world by a series of great congresses, to be held during the progress of the Exposition.

In pursuance of this object the World's Congress Auxiliary was organized by the World's Columbian Exposition, and it has received the recognition and support of the government of the United States.

It is the plan of the World's Congress Auxiliary to bring into communication, through these congresses, the best thinkers and workers in every department of knowledge, including religion, science, philosophy, literature, art, agriculture, trade and labor, etc., and by the presentation and interchange of ideas, methods, theories, and practical experiences to promote the advancement of all that is noblest and best of our present civilization. Committees have therefore been appointed to organize a series of congresses, representing nearly every field of thought, and of speculative and practical endeavor.

In the field of professional achievement, medicine and surgery, in their various special applications, will form a very large and interesting feature of the World's Congress Auxiliary.

Dentistry is an important department of medical science, and an outgrowth of our modern civilization. Its present perfection is in considerable degree due to the thought and labor of American minds.

The history of modern dentistry is covered by a period of less than two generations, and yet it has advanced from the rude operations practiced by the blacksmiths and barbers to one of the most scientific and exact of the specialties of the healing art.

Scientific dentistry had its birth in the United States of America. This country has the proud distinction of having organized the first school for the teaching of dental science, and the establishment of the first periodical journal devoted to the interests of dentistry, while very many of the most useful appliances and scientific methods have originated on this side of the Atlantic.

It is therefore eminently fitting that dentistry be represented at the World's Columbian Exposition by a display of the progress which has been made in the development of its materials, instruments, appliances, processes and methods of a practical nature, and in scientific research, literature, and professional education. With this end in view, the dentists of the United States took steps in August, 1890, to organize such a World's Congress, by the appointment of a General Executive Committee, to whom the whole matter of organizing and conducting the congress was referred.

The work therefore of the Committee on Dental Congresses appointed by the World's Congress Auxiliary will be chiefly, in co-operation with that General Executive Committee, in publishing to the world from time to time the progress of the work of organization, in promoting the interests of the congress in every way within their power, and keeping it in harmony with the general plans of the World's Congress Auxiliary.

Every effort will be made to secure the best talent in the presentation of scientific subjects and in practical demonstrations.

The World's Columbian Exposition, through its directory, will provide ample accommodations for all the various World's Congresses to be held in Chicago in 1893. The Memorial Art Palace now in process of erection upon the shore of Lake Michigan, and located near the center of the city, will be devoted to this purpose. This building will contain two large audience rooms, with a seating capacity of about three thousand each, which will be used for the general congresses of the various departments, besides numerous smaller rooms, suitable for the chapters and sections of the congresses, thus affording for the Dental Congress ample accommodations for clinical demonstrations of a suitable nature.

During the sessions of the Dental Congress several popular evening meetings will be held, to which the general public will be invited. At these meetings, which are intended to be educational, illustrated lectures will be delivered by some of the most eminent men of the profession upon topics which are deemed to be of vital importance to the public. These meetings will be especially under the control and management of the World's Congress Auxiliary. When the suggestion of the advisory councillors of the Dental Congress shall have been received as to the most interesting and vital questions to be presented, a program will be arranged for publication.

A cordial invitation is extended to the dentists of the world to take part in the scientific work of the congress by the presentation of papers and discussions, or demonstrations of new or improved methods and appliances.

America, and Chicago in particular, will have a hearty welcome for all who may come.

An earnest effort was made to bring the meeting of this congress in close connection with others of the department of medicine ; but that effort having proved unavailing, arrangements have been effected under which the meeting of the dental profession will be held on or near August 17, and is expected to continue during the week or ten days following. Definite dates and details will be given in the program.

Communications in reference to the special work of the congress should be addressed to Dr. A. O. Hunt, Secretary World's Columbian Dental Congress, Iowa City, Iowa, U. S. A.

Communications in reference to the general work of the World's Congress Auxiliary and suggestions from the advisory councillors may be addressed to the chairman of the committee.

DR. JOHN S. MARSHALL, *Chairman*,
No 34 Washington street, Chicago, Ill.
DR. A. W. HARLAN, *Vice-Chairman*.
Dr. G. V. Black, Dr. C. N. Johnson, Dr. George H. Cushing,
Dr. N. Nelson, Dr A. E. Baldwin, Dr. A. W. Freeman,
Dr. E. S. Talbot, Dr. George A. Christman,
Committee of the World's Congress Auxiliary on a Dental Congress.

NEW DENTAL JOURNAL IN PARIS.

WE have received the first number of a new dental journal published in Paris, France, called the *Revue Internationale d' Odontologie*. It is under the direction of Mr. Paul Dubois, former manager of *L' Odontologie*, and ex-president of the Odontological Society of Paris, who will have the assistance in its literary conduct of a number of professors of the Dental School of Paris. The first number gives much promise, and we bespeak for it a fair field.

DISTRICT OF COLUMBIA DENTAL LAW—CORRECTION.

WE are requested to make a correction of the names constituting the Board of Dental Examiners under the new District of Columbia dental law, as given in our September issue. We are reliably informed that the board is now constituted as follows: J. Roland Walton, president; Williams Donnally, secretary; John B. Rich, H. M. Schooley, and H. B. Noble.

MORE THAN WAS PROMISED.

THIS issue of the DENTAL COSMOS also contains sixteen pages of text extra, and still much matter which ought to appear has to lie over.

BIBLIOGRAPHICAL.

567 USEFUL HINTS FOR THE BUSY DENTIST. By WILLIAM H. STEELE, D.D.S. Wilmington Dental Mfg. Co., No. 1413 Filbert street, Philadelphia, 1892. Price, cloth, $2.50.

This work is an acceptable compilation of various useful suggestions relating to dental practice which have appeared from time to time in the dental periodicals. The author does not vouch for their utility, nor state that he has extensively tested their value, that responsibility, in most of the items, being thrown upon the authority quoted, who is duly credited.

Such efforts to gather into portable shape useful hints which occur throughout our periodical literature are commendable, as they are otherwise liable to be lost sight of. The book is well printed, and should find a ready acceptance by the dental profession.

A Treatise on Dental Jurisprudence, for Dentists and Lawyers, embracing the following subjects: Dental Jurisprudence, Dental Expert Testimony, Identification by Means of the Teeth, Dental Malpractice, Cocaine Poisoning, Fracture of Maxilla during Extraction of Teeth, Injuries and Deaths due to Anesthesia, the Jurisprudence of Dental Patents, etc. By William F. Rehfuss, D.D.S., author of "Dental Massage," Member of the Odontological Society of Pennsylvania, etc. Philadelphia: The Wilmington Dental Manufacturing Company, 1892. Price, cloth, $2.50; sheep, $3.50.

As stated in a former issue, we consider this volume to be a distinctly valuable and novel addition to dental literature. Dental jurisprudence, in a strict sense, is but a small department of medico-legal science, which, in its main features, applies as fully to the dentist as to the practitioner of medicine. There is, however, a relation which the dentist bears to the law by virtue of his being a dentist, and it is with this special department of jurisprudence that the work of Dr. Rehfuss deals.

Simply as an indication of the rapid and substantial growth of dentistry as a factor in our social fabric, the volume is full of interest. The presentment which it furnishes of the many and often intricate relationships which dentistry holds toward the community is as gratifying as it is surprising.

From a technical legal standpoint, we do not presume to judge of its merits. Adverse criticism along that line seems to have been forestalled by the approval of a reputable and worthy member of the legal profession, which is published at the beginning of the volume. From the dental professional standpoint, its great value is apparent in that it clearly and fully defines and illustrates the position of the dentist in those legal processes where he may be called to appear as plaintiff or defendant, witness or expert, involving questions which arise chiefly or exclusively in relation to dental practice.

The various statutory enactments of the several states defining the right to practice dentistry are fully set forth, also the laws affecting patent rights in dentistry, as well as a very satisfactory tabular presentment of the multitudinous patent claims relating to artificial tooth-crowns. These are valuable features of the work.

We unhesitatingly commend the volume to all dental practitioners as one which cannot fail to be an important addition to any dental library, and a familiarity with its contents will be a safeguard in the conduct of dental practice.

THE ESSENTIALS OF HISTOLOGY. Descriptive and Practical. For the Use of Students. By EDWARD A. SCHÄFER, F.R.S., Jodrell Professor of Physiology in University College, London, etc. New (third) edition, revised and enlarged. In one octavo volume of 311 pages, with 325 illustrations. Philadelphia: Lea Brothers & Co., 1892. Price, cloth, $3.00.

A new edition of this well-known work of Professor Schäfer will be eagerly welcomed by all students engaged in the study of histology. The accuracy of Professor Schäfer's scientific investigations has been so generally recognized that this book has become the accepted laboratory manual in many medical schools. There is probably no similar work in the English language which will furnish the student, in a more satisfactory manner, with the methods and results of histological investigations. Its clear, concise descriptions of the essential facts of the science, illustrated by more than three hundred admirably executed diagrams, make it an almost indispensable work for study and reference. The book is divided into forty-five lessons, each of which is preceded by a brief yet sufficiently complete statement of the methods best adapted for the preparation of the tissues for microscopical examination. Inasmuch as this book contains merely a statement of the well-ascertained facts of histology, and is not controversial in character, Professor Schäfer's views do not call for comment. The statements as to the ultimate structure of the muscular fiber differ from the generally accepted view of Rollet, but from the difficulties surrounding this subject it is impossible to say which is more nearly correct.

BOOK ON THE PHYSICIAN HIMSELF, and Things that Concern His Reputation and Success. By D. W. CATHELL, M.D. New (tenth) edition (author's last revision). Thoroughly revised, enlarged, and rewritten. In one handsome royal octavo volume. 348 pages, extra cloth. Philadelphia: The F. A. Davis Co., publishers, 1231 Filbert street. Price, post-paid, $2.00, net.

The popularity of any book which reaches a tenth edition is sufficiently attested by that fact alone.

The character of this work is fully indicated in its comprehensive title. It is filled with pointed illustrations and witty examples of the many items which go to make up the daily professional and social life of the medical practitioner. These are presented in their relation to the question of his professional success. There is much in the book which furnishes food for thought, and its perusal by the practitioner of dentistry would be time profitably spent, as its good, wholesome teaching with regard to professional matters applies in a general way to dental professional life as well as to medical.

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OBITUARY.

DR. J. ALBERT KIMBALL.

Died, in New York city, August 16, 1892, by suicide, J. Albert Kimball, D.D.S., in the fiftieth year of his age.

Dr. Kimball committed suicide by cutting his throat with a razor, at his office, No. 28 West Twenty-sixth street, New York, on the date above given. He was born at Kimball's Hill, N. H., in 1842. He was a graduate of the New York College of Dentistry, class of 1868, and had had an excellent practice in New York for many years. He was also the editor and proprietor of *The Dentist Himself*, a thirty-two page monthly publication of dental miscellany and advertisements, which he commenced to issue in January last. He left a message to his wife in which he said that he felt that his choice lay between death and a lunatic asylum, and he preferred the former. His condition was the result of suffering from nervous prostration, which produced a state of melancholia and a fear that he was going toward insanity. Dr. Kimball came of a good family, and was reputed to be wealthy. He was genial and popular. His wife and several children survive him.

DR. JAMES VAN ANTWERP.

Died, at New Brunswick, N. J., August 5, 1892, of heart-failure, Dr. James Van Antwerp, in the fifty-eighth year of his age.

Dr. Van Antwerp was born in New York city, June 19, 1835, and was a descendant of an old Holland Dutch family. His father's hardware business in New York being destroyed by the great fire, the family removed to a farm in Warren county, New Jersey, whence, when twenty years of age, Dr. Van Antwerp went to Brooklyn and studied dentistry with Drs. Miller and Cook. After four years' study he associated himself with his brother, who was then practicing dentistry in Brooklyn, giving special attention to the manufacture of rubber dentures for his fellow-practitioners. He then went to New Brunswick, N. J., and formed a partnership with Dr. A. D. Newell. After about three years he relinquished practice to go into the jewelry business in New York, having a manufactory in Providence, R. I. About 1865 he returned to New Brunswick, and gradually established the fine dental practice which he continued nearly up to the time of his death.

Dr. Van Antwerp was a member of the New Jersey State Dental Society and of the Central Dental Association of Northern New Jersey. He was twice married,—first to Miss Phebe Stout, and secondly to Miss Catharine Cannon, who survives him. He had four children. He was an exemplary husband and father, devoted to his profession, and much respected as a citizen.

DR. OLIVER F. HARRIS.

Died, at Boston, Mass., April 21, 1892, from an operation for an affection of the urinary organs, Dr. Oliver Follett Harris, of Worcester, in the seventieth year of his age.

Dr. Harris was born in South Windham, Conn., in October, 1822. He studied dentistry with Dr. William Allen, of Norwich, and for some time after pursued an itinerant practice in that section. He went to Worcester, Mass., in 1845, and associated himself with Dr. H. F. Bishop, but soon established an office by himself, and for many years did a large and lucrative business. In 1868 he went to Florida, where he remained for several years engaged in the hotel business, but returned to Worcester in 1876, and resumed dental practice there, continuing it up to the time of his decease.

Dr. Harris was the first president of the Worcester Dental Society, was a member of the Massachusetts State Dental Society, and of the Connecticut Valley Dental Society. He was twice married,—first to Miss Julia Tracey, of Connecticut, and secondly to Miss Mary Cross, of Worcester, who survives him. He leaves one daughter by his second wife. Dr. Harris was held in high esteem by members of the dental profession, as well as the community at large.

DR. SAMUEL A. GARBER.

Died, at Cedar Rapids, Iowa, September 1, 1892, of heart-failure, Samuel A. Garber, D.D.S., in the fiftieth year of his age.

Dr. Garber was born in Higham county, Ohio, March 17, 1843; removed with his parents to Iowa in 1856, and settled near Jefferson in that state in 1867. He studied dentistry with Dr. J. S. Reynolds, of Orangeville, Ill., and subsequently bought out Dr. Reynolds and continued that practice until 1873, when he removed to Tipton, Iowa, where he soon established a large and lucrative business. He removed to Cedar Rapids in May last.

Dr. Garber filled many positions of honor and trust. He was secretary of the State Board of Dental Examiners of Iowa from 1886 to 1892, and at the time of his death was a member of the board. He had the confidence and esteem of a large circle of patrons and friends. He leaves a wife, one son, and a daughter. His death was somewhat hastened by much recent sickness in his family, and especially by the loss from typhoid fever of two sons just growing to manhood.

PERISCOPE.

Hemorrhage after Cocaine in Tonsillotomy and Extraction of Teeth.—Dr. Buisseret (*Revue de Laryngologie*, No. 22, 1891; *Med. Neuigkeiten*, No. 48, 1892) claims cocaine to favor the production of hemorrhage after tonsillotomy and extraction of teeth. The anemia caused by the anesthetic is followed by subsequent dilatation. Besides the heart, the drug also influences the arterial system and causes vaso-motor disturbances.—*Cincinnati Lancet-Clinic.*

Essence of Cassia as an Antiseptic.—Dr. Black (*La Semaine médicale*, No. 59, 1891) has found the essence of Chinese cassia a powerful antiseptic, even in a 1 : 4000 solution. It is superior to boric and carbolic acids; it is not irritating, and has an agreeable odor. It may be used with advantage as an antiseptic in surgical and gynecological practice, and as an emulsion, dissolved in distilled water, or mixed with boric acid. For concentrated solutions use a concentrated solution in cinnamon-water.—*Cincinnati Lancet-Clinic.*

Blackening of Teeth by Antipyrin.—It is asserted that the internal use of antipyrin blackens the teeth. This peculiarity should be generally known by the profession, and also among the laity, that objections may be made on this ground to taking it as a remedy. The blackening is the more intense, the more imperfect the enamel, but may be removed by attrition with dilute acid. The considerable use of antipyrin for several years back gives importance to this latter observation.—*Southern Dental Journal.*

HINTS AND QUERIES.

Adjustment of Crowns.—The following method for the adjustment of Logan and similar classes of crowns I have found extremely satisfactory in cases where there has been much loss of root-structure through the action of caries in the pulp-canal, resulting in a large funnel-shaped opening with more or less weakened root-walls.

After preparing the canal by removing the softened structure, filling the apex, and making suitable undercuts or roughnesses within the canal, the latter is filled flush with its orifice with a good grade of copper amalgam softened to a plastic, buttery condition. The apical end of the tooth-crown pin is sharpened to a point or hatchet-edge, as may be most expedient, and placed against the amalgam surface in the root-opening. A suitable point, mounted in the Bonwill mechanical mallet, is held in contact with the morsal surface of the crown, which is driven to place in close contact with the root by blows rapidly delivered from the mallet. All excess of copper amalgam is by this means driven out between the surfaces of contact of the crown and root in precisely the same manner as occurs in the use of oxyphosphate. The point used in the mallet for driving the crown to its seat is best improvised from a porte polisher armed with a hickory point, the use of which avoids chipping the porcelain. An excess of copper amalgam should be used, in order to fill all interstices. This method, involving the use of copper amalgam, is advocated only in the class of cases described, and possesses the advantages of giving complete support to the root, great strength of the material employed, and its insolubility. Other amalgams experimented with for this purpose have not been so satisfactory, because of their lack of plasticity and flowing quality which characterizes the copper amalgam when subjected to the rapid, vibratory, percussive force of the mechanical-mallet blow, which for this purpose should be considerably increased in intensity beyond that ordinarily used for filling-operations.—Edward C. Kirk.

A Paraffined Cement-Slab.—A piece of American or English tile having its pores filled with melted paraffin makes a very good slab for the mixing of oxyphosphate or other cements. These will not adhere to the paraffined surface as firmly as to a glass or porcelain slab, and after the surface has by use become roughened, it can be made smooth again by re-heating and applying more paraffin.

I know of nothing better for the purpose, unless it be a device suggested by Dr. Le Roy Requa, which consists of a compact pad of writing-paper, which from use gradually grows less by the removal of a sheet at a time.

Another use can be made of the paraffined tile, which, when wet and dipped quickly in melted wax, will form of it thin and smooth sheets for office and laboratory uses. A smooth slab of plaster of Paris is, however, fully as good, if not better.—J. H. Beebee, Rochester, N. Y.

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

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LIST OF UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING AUGUST, 1892.

August 2.—No. 479,796, to Lewis T. Foss. Tooth-brush.
" " No. 479,937, to C. W. Fox. Spatula.
" " No. 479,948, to F. F. Loomis. Electric drill.
" " No. 480,024, to G. W. Melotte. Blow-pipe pad.
" " No. 480,121, to M. S. Nichols. Disk carrier.
August 9.—No. 480,261, to C. A. Herr. Dental bracket.
" " No. 480,357, to A. E. Worthen. Jaw brace.
" " No. 480,471, to G. W. Melotte. Pad.
" " No. 480,472, to G. W. Melotte. Rubber heater.
" " No. 480,678, to C. W. Thomas. Dental engine.
" " No. 21,771, Design, to C. E. Blake. Dental punch.
August 23.—No. 481,164, to F. A. Damon. Dental engine.
" " No. 21,796, Design, to E. L. Button. Dentifrice box.
" " No. 481,479, to J. S. Deardorff. Dental clamp.
August 30.—No. 481,740, to R. G. Stanbrough. Dental tool.

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ORIGINAL COMMUNICATIONS.

A BRIEF STUDY OF THE MOLAR TEETH OF THE PROBOSCIDIAE.*

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(Read before the American Dental Association, Niagara Falls, N. Y., August 3, 1892.)

THE student of comparative dental anatomy nowhere, in all the broad realms of nature, finds better opportunities for study than in the teeth of the Pachydermata, or thick-skinned animals, a subdivision of the great order of the Ungulata, and in which the Proboscidians form a sub-order. In tracing the modifications of dentition through the different species, it must be remembered that a number are lost, and the regular gradations do not appear.

Nor should this be considered a thing strange. When we reflect that of the living animals existent upon the earth at this time, the remains of scarcely one will probably be found sufficiently intact to allow of any inspection a few ages hence, and then remember the millions of years which were required to produce any material modification, it is no wonder that many important genera are lost. Countless numbers of animals are dying annually. How often is the complete skeleton of even a bird found in the fields or woods? It requires a peculiar combination of circumstances to produce a fossil. Only such organized beings as existed in situations that, through geological changes, allowed their sudden imprisonment within a forming matrix, would find these favoring conditions. A sudden upheaval of plastic material, like clay or fine disintegrated rock, might so bury them that ordinary decay would be impossible. Then, under very unusual circumstances, there might be a slow substitution of the organic material by mineral elements, without the loss of the appearance of structure, and a mineralized, indestructible fossil would be the result. It is only at the margins of great bodies of water that these favoring circumstances are found. The changes there may be induced by unequal cooling and shrinkage of the crust of the earth, and it will only be in such locations that the proper investing matrix will be found.

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* The beautiful sections of the teeth of Elephas, and most of the accompanying specimens, were prepared in the Natural Science Establishment of Henry A. Ward, Rochester, N. Y., and loaned to the author for study and illustration.

In the interior of great bodies of land the geological changes are usually much slower, and hence there is no opportunity for mineralization. The more violent geological modifications are brought about by volcanic action, and the heat destroys all organic matter. Hence it is only the very ancient animals and structures which lived near the margins of great seas, or within them, that exist in a mineralized fossil form to-day. The terrestrial fauna and flora have entirely disappeared, no trace of them being left, and thus have been obliterated the modifications of orders, and the traces of many early species of the Mesozoic and Tertiary ages. Occasionally the upheaval of what was once the bed of a great sea brings to light hidden treasures, as in the fossil beds of Wyoming, in the center of what is now the North American continent.

But in the pachyderms, as they now exist, or have existed within comparatively modern times, modifications may be traced which are a sure indication of the gradual development of certain species through the lapse of cycles of time. We find families which in their dental development seem to the ordinary observer as widely separated as the East is from the West, but which a close examination proves to be near congeners.

What analogy, for instance, is there between the tapir, the last remnant of a great Eocene family, with its forty-two teeth in full use at one time, and the elephant, the final existing species of the almost extinct Proboscidians, having only six? And yet the gradations are plainly indicated. The molars of Tapirus have distinctly cone-shaped divisions of the crown. In the Dinotherium these are also found, but the separate denticles have united, and the cone-shaped prominences have become sections, each having its separate root. There are modifications of this change found in certain intermediate forms, which indicate the process of union of the separate teeth, showing that both dentitions had the same common source.*

In the fossil mastodon, named from the shape of its teeth (μαστος, a nipple, and οδους, a tooth), we find the same general form of dentition, but materially modified as to structure. Finally, in Elephas there is a yet further modification, the cone-shaped prominences being lost, and the separate denticles taking the form of dentinal plates. The structure, too, is changed, but there still remains the body of dentine surrounded by enamel, the whole being united by cementum, the modifications being those which would be induced by the gradual change of the denticles into dentinal plates.†

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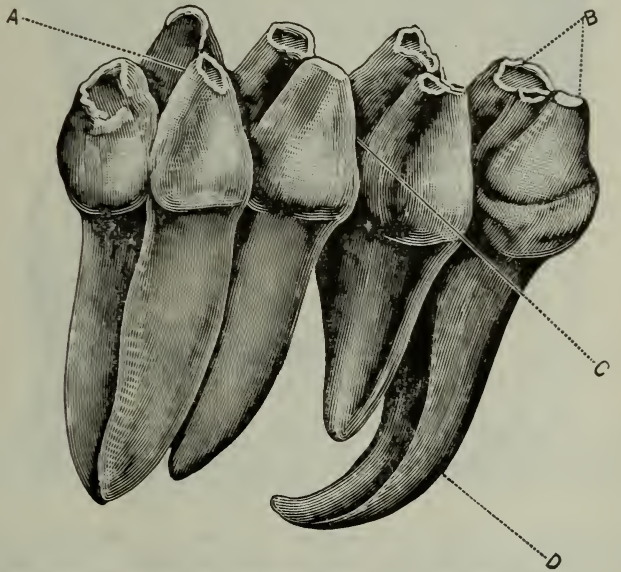
* The near relation of most of the Pachydermata is indicated by the peculiar form of the nose or snout. In the hog this is prolonged and muscular, and serves it for explorations in the ground. In the rhinoceros it is an extremely flexible and pliant organ. In the tapir it is extended into a prehensile lip between the nostrils. The trunk of the elephant is but the prolonged and specialized nose of the hog.

† The human tooth, and that of the carnivora, consist of a body of dentine, covered with enamel in the crown and cementum in the root. If the human tooth were enveloped in the jaw as completely as that of the elephant, and were developed entire before eruption, it may readily be seen that the cementum would naturally extend up over the crown and cover the enamel. If now

The six incisors of the tapir we find reduced to four in the mastodon, and of these the inferior ones are rudimentary, while the superior permanent pair, finding no lower ones with which they might occlude, grow to an enormous size and are developed into tusks, precisely as the incisor teeth of rodents grow to a great length when the opposing one is lost by accident.

In the Dinotherium it is the superior incisors which have become rudimentary, and the lower ones are in the same manner developed into great tusks, preserving their natural outward curvature. In the elephant the incisors follow the law of its congener, the mastodon, keeping the natural curve that is imparted to them by the shape of their sockets, and develop into those enormous tusks that distinguish the species. The study of the incisor teeth of the elephant is a fascinating subject, but the limits of time demand that I should confine myself mainly to a consideration of the molars. Dr. Miller, in the DENTAL COSMOS (vols. xxxii, xxxiii), has given a very valuable series of papers upon the development and certain pathological disturbances in the tusks of elephants, and to that let me refer the student who desires something further in this direction.

FIG. 1.



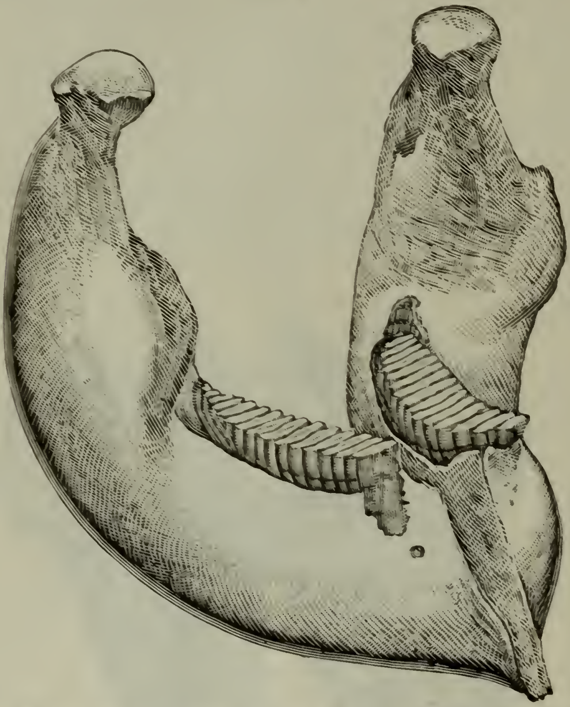
Tooth of *Mastodon giganteus*. *A*, posterior tubercles; *B*, anterior tubercles; *C*, depression between the denticles; *D*, long curved anterior root.

It may be seen that the structure of this tooth does not essentially differ from that of its congener, the elephant. If the different sections were consolidated by a layer of cementum, with a dentinal base, it would present nearly the same characteristics.

such a tooth be worn away until the dentine is reached, it would present almost exactly the characteristics of that of the elephant,—a ring of enamel inclosing a body of dentine, the whole enveloped by cementum. The elephant's molar is made up of a number of such separate denticles, bound together by the enveloping cementum, each presenting the same structural arrangement of tissues that the human tooth would do under like circumstances. The modifications that appear so extreme are, therefore, only the natural changes demanded by peculiar environments.

The dentition of *Mastodon giganteus*, of North America, is a distinct modification between that of the Dinotherium and the elephant. A part of the molars are succeeded by vertical successors, as is usual in the diphyodonts, so that there are, strictly speaking, true premolars. The denticles which make up the compound tooth follow the general law in mammalian tooth-structure, and are formed of a body of dentine covered by enamel, with a root envelope of cementum. (See Fig. 1.)

FIG. 2.

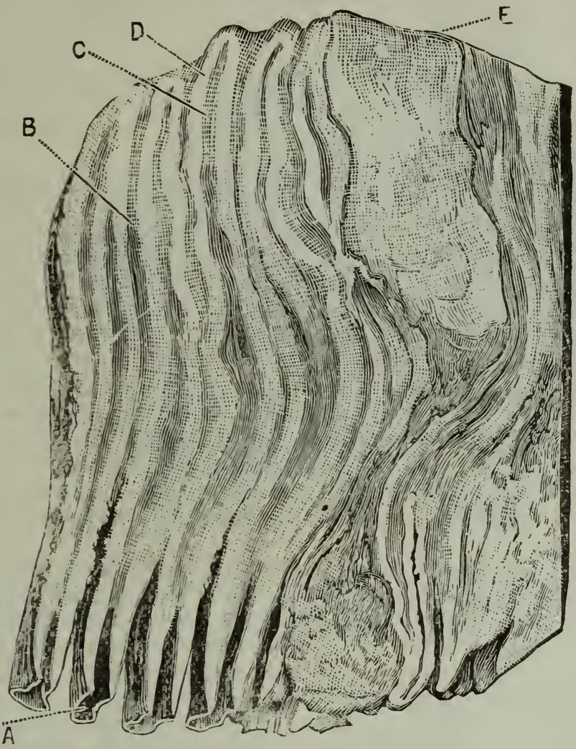


Lower jaw of Asiatic elephant, showing the single tooth that alone is in full use at any one time. The arc of the circle which they describe in their advancement is indicated, and the thickened ramus, which contains the germs of the plates of the succeeding teeth. The anterior roots have been formed and are in process of absorption, and the anterior plates are nearly worn away

In the molar of the true elephant we find a remarkable modification, not only in structure, but in development. The succession, instead of being vertical, is horizontal. The formula is as follows: $\frac{2-2\text{ m. }6-6}{0-0\text{ m. }6-6} = 28$. Of the incisors two are deciduous, while the permanent ones form the great tusks. The molars of the elephant are of great proportionate size, especially those which make their appearance late in life. There is never but one on each side of the jaw in full use at any time, and all through life there is going on the constant process of the shedding of this and the formation and advance of its successor from behind. (See Fig. 2.) The food of the elephant is of an exceedingly coarse character, and although the structure of the molars is such as to offer the greatest resistance to attrition, yet no other form of dentition would be sufficient for the long life of the animal.

The germs of the six molars on each side of each jaw exist within the body of the maxillæ, and are developed in turn as the predecessor is worn out and shed. The structure is very complex, and is shown in the chart which I exhibit. (See Fig. 3.) The teeth are made up of transverse, perpendicular plates, which are developed separately within a crypt in the jaw. The size of these plates depends somewhat upon the age of the animal. I exhibit to you the bisected jaw of an adult elephant, and as I open it you are able to see the crypt or chamber which contains these developing plates. Each of them consists of a body of dentine, surrounded by an enamel covering. The development is from these elevated points, as shown in this figure, which give to the forming plates a serrated appearance, not unlike that sometimes seen in the newly erupted incisors of children. These plates are open at the base, the cavity being occupied by the pulp-tissue from which the dentine is developed.

FIG. 3.



Vertical section of molar tooth of elephant. *A*, open ends of dentinal plates, occupied by the pulp; *B*, cementum layer, binding the different plates together; *C*, dentine, inclosed within the enamel; *D*, enamel covering of plates; *E*, masses of cementum deposited between irregularly developed plates.

The tooth was not fully erupted, as the cementum covering had not yet been worn sufficiently to expose the enamel.

I have not had the opportunity to examine any fresh specimens microscopically, so that it is impossible for me to say in just what manner the enamel is formed ; but as that tissue covers the whole plate, and as during the process of formation these are separated by a considerable space, it is probable that there is a separate enamel-organ for each one, and that this continues its function to the time when the plates coalesce into the complete tooth. In the rooms of the Odontological Society of New York there is the complete skull of an elephant, the jaws bisected as are some of those now before you, but in which the separate plates are in a more advanced condition than are these, and which therefore more fully illustrate the formation. In that the plates are perhaps three times as large as are the ones I now show you.

The growth of these plates continues until the enamel-membrane is exhausted, when there is, from the several divisions of the pulp, a further deposition of dentine, which forms a strong base for the whole, uniting the plates into a solid body. As the tooth after eruption is worn away, roots are developed, which serve to retain it in position. In its earlier stages it is held by the great body being within the socket.

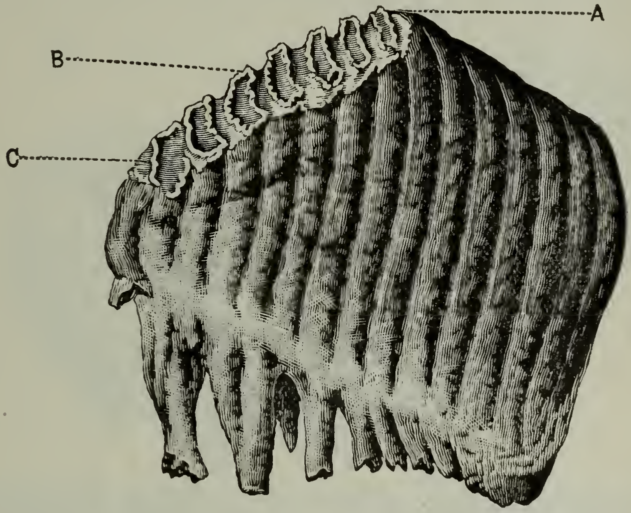
Coincident with the formation of the great body of dentine at the base, the enveloping membrane begins the deposition of cementum between and about the separate plates, thus uniting their upper portions into a solid body as the dentine unites the base, and in this manner is formed that complex structure illustrated in the diagrams exhibited, as well as by the numerous prepared sections upon the table before me. There is, then, here in the center of each plate, a body of dentine surrounded by a complete ring of enamel, and uniting the separate plates a stratum of cementum, thus presenting a yet more perfect arrangement of alternate dentine, enamel, and cementum than is found in the molars of the more common Graminivora. The several tissues offering a different degree of resistance, the teeth are worn into the alternate ridges and depressions that offer the most perfect surface for the proper comminution of coarse food.

As the deposition of the enamel about the body of the dentine in each separate plate proceeds, it assumes a wavy or undulating appearance. In the Indian elephant, and in the extinct Mammoth, the sides of the enamel-walls are parallel, thus causing the enamel to present the appearance of a complete and regular ring. In the African elephant the body of the dentine is much thicker in the center, and the enamel covering is expanded until there may be a complete separation in the middle of the ring, giving to the dentine a lozenge shape, and to the enamel of each lateral half of the tooth a zigzag appearance. This is very apparent in some of the teeth now before you, and by this peculiarity of structure it is comparatively easy to determine to which species each belonged. In the Mammoth the plates are thinner and more numerous, as may be observed in this specimen.

In the procession of the teeth, a part of the posterior one comes into use before its predecessor is thrown off, for the whole process is a gradual one. While all the posterior plates are covered by the gum and bony tissues, the anterior ones are in use. Here is a tooth in which it may be seen that the first three or four plates are considerably worn, while the posterior ones bear no such marks. (See Fig. 4.) In the lower jaw the forming teeth lie within the ramus, while in the upper they are within the retreating portion. In the course of their descent, therefore, following the general contour of the jaw, they describe the arc of a circle, instead of advancing in a straight line. This peculiar conformation, therefore, presents the anterior angle of the tooth first. As it gradually descends from above and reaches the plane of the body of the jaw, the tooth assumes a horizontal position, and the successive plates are brought into full use. Before its eruption it stands almost at a right angle to its predecessor.

This peculiar method of progression forms one of the most striking characteristics of the dentition. It brings the plates successively into use, and by the time the last one is in full action the anterior ones are considerably worn away. The tooth will then have a wedge shape, and its anterior border would have but a comparatively slight hold in the jaw, were it not that this is compensated by the development of the anterior roots. (See Fig. 5.) In the course of the attrition the foremost plates become worn down to the dentinal base and are smooth, while the posterior ones yet have their enamel intact. This serves a useful purpose in mastication, for, as Owen remarks, the coarse limbs and twigs of trees are broken up and crushed on the anterior smooth plates, and thoroughly comminuted between the deeply ridged posterior ones.

FIG. 4.

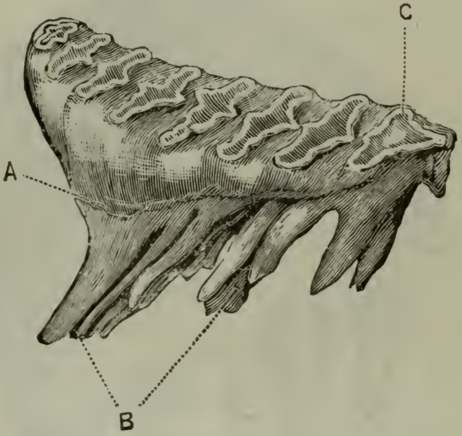


Upper molar tooth of Asiatic elephant. *A*, gum-margin and limit of erupted plates; *B*, enamel of the plates; *C*, much worn anterior plates, the roots of which have begun to develop. The line of the summits of all the plates, from *C* to the posterior unerupted ones, is nearly the arc of the circle which the tooth describes in its advance. If the roots were continued they would reach the apparent pivot or axis upon which the tooth seemingly turns in its progression. This provision brings the several plates into successive use.

When the tooth becomes worn down so far that the basal mass of dentine is seriously interfered with, the pulp seems to lose its functional power, and becomes exhausted. A reversal of the process now sets in, and there is resorption of the roots, until the advance of its successor crowds it forward and finally out of the jaw, the other taking its place. This process is repeated in the several teeth until the last one appears, and this is sufficient for the needs of the animal until it dies from old age.

Each successive tooth presents an increased number of plates, and therefore lasts for a longer time than its predecessor. The sixth molar seems to develop more slowly than any of the others, and to have an unusual number of plates, which come into use with increasing tardiness. It would seem that in an animal that lives to an extraordinary age the plates are continually added, that the tooth may serve for mastication until death. Here is such a one. (See Fig. 6.) The animal to which this belonged was probably considerably past the half-century mark, and yet it will be seen that there are many years of service left in the organ. While the first plates show the attrition produced by actual use, the last ones are yet in the process of formation, being quite immature. Of the twenty odd plates only ten have as yet been brought into action, and some of these are not worn down to the solid enamel. There was here a dental provision for many years of life.

FIG. 5.



Molar of African elephant nearly worn out, and showing the process of extrusion from the jaw. *A*, basal body of dentine; *B*, the posterior roots, developed as the body of the tooth is worn away, for the purpose of holding it in the jaw; *C*, anterior plates worn down to the dentinal base.

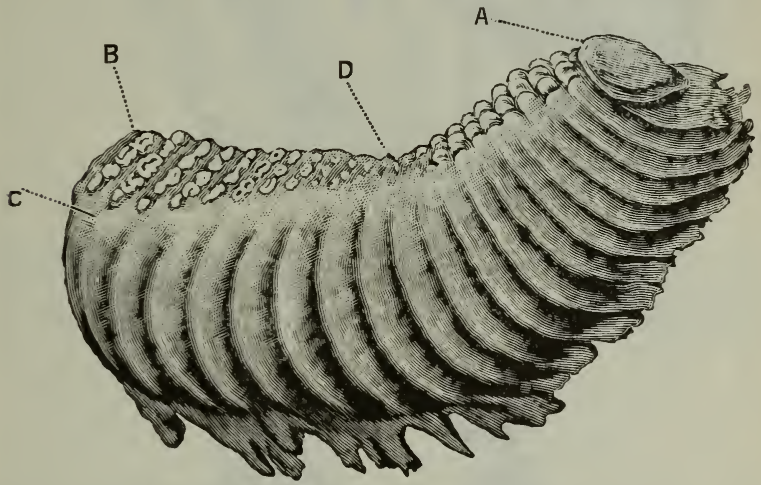
The anterior roots have commenced the process of absorption.

I have here the skull of a young Indian elephant, in which the points of the deciduous tusks are but just discernible. (See Fig. 7.) The exact age of the animal I have not been able to determine, any further than by the appearance of the skull. But it will be observed that the tissue around the extremities of the tusks is in a cartilaginous condition, and that they had not yet protruded through the gum, which should occur between the fifth and the sixth month. Yet the first molar is completely erupted, and shows some attrition, so that it is probable that the young animal at death was three or four months old. The bones of the head, while firmly united, are yet very frail, and the zygomatic processes but partially ossified. The first molars, which cut the gum in the second week, with portions of the second, are plainly visible, and illustrate the formation of the teeth very perfectly.

In the upper jaw the first molar has six plates, while in the lower there are seven. The anterior plates of the second molar were not yet erupted, but they are completely united by cementum, while the posterior ones are only held by the dentine at their base. The crypt for the third molar may be distinctly observed, although the plates are not sufficiently developed to be plainly seen. (See Fig. 8.) But the progression through the arc of a circle is beautifully illustrated, and the manner in which they are brought into use.

Owen says that the first molar, which is in complete use at three months, and is shed at about two years of age, usually has four plates, but in this specimen there are more.* The second molar, according to the same authority, has eight or nine plates, and that is about the number in this. He gives the length of the first molar at less than an inch, while in this specimen they are fully two inches. The second molar, he says, is about two and a half inches in its antero-posterior diameter. In this skull, although not fully developed, it is more than three inches. It may thus be seen that there is no determinate number of plates in different individuals, but that it varies with the development.

FIG. 6.



Lower molar of Asiatic elephant. *A*, posterior plates in process of formation. *B*, anterior plates, but little worn; *C*, gum-margin; *D*, plates just appearing through the gum. All posterior to this point were yet unerupted.

This tooth was evidently the sixth molar of an elephant that had passed the half-century of its existence. The crescentic shape is the arc of the circle which it described in descending. It is probable that as the anterior plates of the sixth or last molar are worn away, others continue to be formed at the posterior border as long as life continues. This one consisted of twenty-three plates. It measured fifteen inches in length, and weighed fourteen pounds in its dried state.

The third molar has from eleven to thirteen plates, and is shed during the ninth year. The plates of the fourth molar number fifteen

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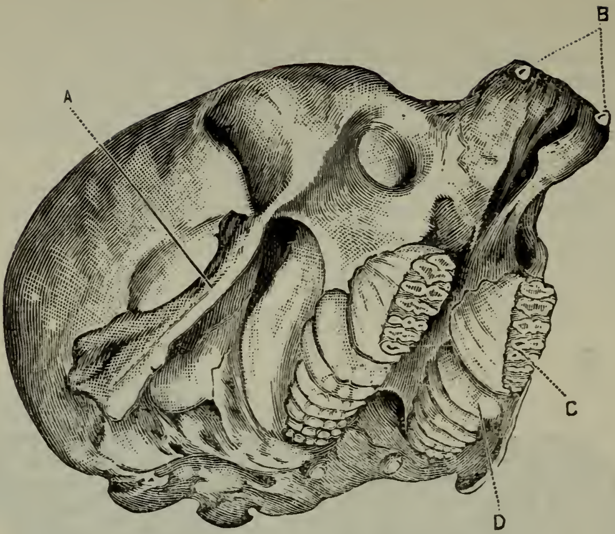
* I have not been able to make the number of plates, or the measurements of the teeth that I have examined, conform to those laid down by Owen. There is undoubtedly a considerable variation in individuals, and the different species do not follow exactly the same rule.

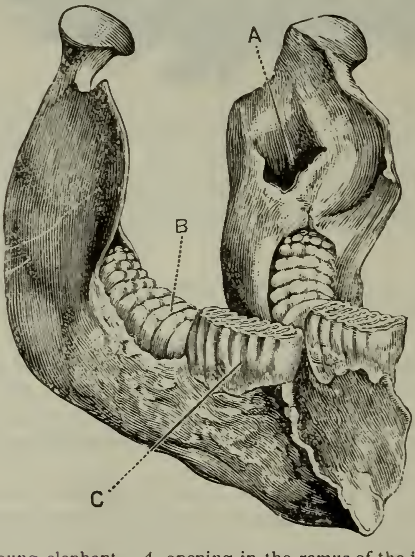
FIG. 7.



Upper jaw and skull of a very young elephant. *A*, the partially ossified zygoma; *B*, the points of the unerupted deciduous incisors or tusks; *C*, the first molar, somewhat worn and showing the transverse structure of the plates; *D*, the plates of the second molar, covered by the gum-tissue and unworn.

The cementum between the plates has not yet all been deposited, and the alveolus was not fully developed.

FIG. 8.



Lower jaw of very young elephant. *A*, opening in the ramus of the jaw, in which may be seen the germs of the succeeding plates; *B*, unerupted plates of the second molar; *C*, first molar, showing the anterior plates more worn away than the posterior ones.

The first teeth in descending move through the arc of a smaller circle than their successors, which make their appearance when the jaw is longer and larger, and therefore they necessarily contain a less number of plates.

or sixteen, and it is shed from the twentieth to the twenty-fifth year. The fifth molar has from seventeen to twenty plates, and is probably not shed until the sixtieth year. Thus the first molar lasts but about two years. The second remains about four years, the third about the same time, the fourth eleven or twelve years, the fifth thirty years, while the duration of the sixth has not been definitely determined.

The plates of the sixth molar are from twenty-two to twenty-seven, and it is from twelve to fifteen inches in length. Owen says, in his "Odontography," that from its superior depth and length this should continue the work of mastication until the ponderous pachyderm has passed the century of its existence, but in his "Anatomy of the Vertebrates" he recommends further observation of this tooth in captive elephants. Mr. Corse, in his memoirs, has figured a seventh and eighth molar, and this would very materially add to the probable length of existence of the animal. But, accepting the number of plates in each successive molar as given by Owen, it is comparatively easy to tell the age of any elephant by the condition of the existing molars.

The advance in the grinding-teeth is accompanied by a like advance in the alveolus, which is developed with them. The tooth, as it emerges from the body of the jaw, is enveloped in the cancellous bone which forms the socket, and as it moves forward there is a corresponding progression of the alveolus which retains it, and which is finally resorbed with the roots of the teeth as they reach the most anterior point, thus allowing their final removal. At the same time there is a new formation about the succeeding molar, which passes through the same stages. It would be difficult to conceive how the progression of the teeth could be accomplished by any other means.

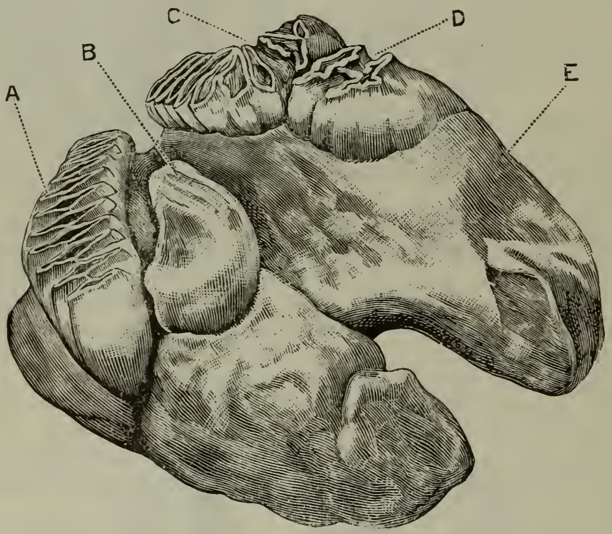
Although there are no deciduous molars, the elephant is provided with milk incisors, or tusks, which grow to the length of but a few inches, and are shed between the first and second years. They are almost immediately succeeded by the permanent ones, which, arising from persistent pulps, like the incisors of the Rodentia, like them continue to grow through life.

Abnormalities in the development of the teeth of these great mammals are not unknown. Especially are the incisors or tusks liable to irregularities. Not infrequently is their direction changed, through some injury to the alveolus. I have more than once seen captive elephants, the points of whose tusks crossed each other. Occasionally one tusk is considerably more elevated than the other. To a certain extent they are movable in their sockets, and a continuous pressure upon them will change their direction and relative position. These irregularities may be corrected, when the animal is not too old, by any force continuously applied, precisely as the human teeth are made to assume new positions by artificial means.

In the rooms of the New York State Agricultural Society, at Albany, is the skeleton of the celebrated Cohoes mastodon, which was dug up some years since. The inferior jaw shows the loss of one of the molars, probably through some accident, and the alveolus has completely closed over the place. Probably the animal was not a very old one, but there are no signs of another molar beneath it. If it were possible to make a section of the jaw, perhaps something of interest might be discovered. I noticed this peculiarity some years ago, but have never seen it mentioned by any author. I have not had the opportunity to make a very thorough examination of the case, something which I propose to do in the near future.

The most singular malformation that I have ever observed in any animal, appears in the upper jaw of the celebrated elephant "Jumbo," which was killed in a railroad accident a few years since. This was an African elephant of prodigious size, although it had scarcely reached the age of full maturity. Captive African elephants are rare, the most of those in menageries being of the Asiatic species. The skeleton of "Jumbo" was mounted at the Natural Science Establishment of Professor Henry A. Ward, of Rochester, N. Y., for Barnum & Bailey, the showmen proprietors of "Jumbo" when alive, and is deposited in the rooms of the Society of Natural Sciences, in Central Park, New York City. I visited the skeleton a few months since, and called the attention of the superintendent to the many points of interest it presented, suggesting the advisability of an examination by making sections of the jaw. I was informed that as it was not the property of the society this could not be done, but they would endeavor to obtain the necessary permission of Mr. Bailey to do it.

FIG. 9.



The upper teeth of "Jumbo," the African elephant exhibited with Barnum's circus a few years since.

A, the fourth molar in succession, comparatively regular but occupying a position outside the normal, and standing at an angle of nearly thirty degrees. The tooth is curved, the buccal aspect being the convex surface.

B, a few of the plates of an abnormally developed fifth molar. This tooth is as irregular in structure as in position. The plates run nearly longtitudinal to the antero-posterior axis of the tooth.

C, the irregular left fourth molar. The posterior plates of this tooth stand at an angle of nearly ninety degrees to the anterior ones, the concave surface being the lingual aspect.

D, a few irregularly developed plates of the left fifth molar.

E, the alveolus, probably containing the undeveloped plates of the fifth molar.

I exhibit here casts of the upper jaw, obtained when the skeleton was mounted in Professor Ward's establishment. (See Fig. 9.) It will be seen that the aberration was remarkable. There are two molars in each jaw, fully erupted. At his death "Jumbo" was about twenty-five years of age, and this would make of these the fourth in succession, provided the usual rate of progression had been followed. Yet Owen and Corse say that the fourth molar has about fifteen plates, while these have but ten. The same authorities give the length of the tooth at about eight inches, and that is the size of these. So we may probably accept them as the fourth molars.

None of the visible teeth occupy their normal positions, nor are any of them of the usual form. The right molar is nearest the normal, yet this is curved considerably, the convex surface being outward. Instead of lying longitudinally in the jaw, it stands at an angle of about thirty degrees. The plates, however, are normally developed.

Lying inside the posterior half of the tooth, and at nearly the same angle with the jaw, are the first five or six plates of the succeeding molar. In the plaster cast it is difficult to determine just what was the situation, but the plates were markedly distorted, some of them lying almost longitudinally, instead of transversely. Those which were not yet fully developed were on a still different plane, the posterior half of the tooth standing at an angle to the rest. Only a section of the jaw would reveal the exact manner of their formation.

The left fourth molar presents a still greater anomaly, the convex side being inward. At about the junction of the fifth and sixth plates the tooth makes a sharp bend, the posterior plates standing at an angle of nearly ninety degrees to the rest. The developed portion of the left superior fifth molar presses against the deflected posterior plates of its predecessor, in such a manner as to tend to turn it upon its axis. The plates of the fifth molar are irregularly developed, the first and second being nearly an inch apart, and the others separated by a very wide layer of cementum.

The general aspect of this case is that of the irregular development of the fifth molar without the removal of the fourth, and the malposition of all of them. The fourth molars are worn, the anterior plates being almost reduced to the dentinal base, but there has not apparently been the usual absorption that should take place at this time. The alveolus, especially upon the right side, has been extraordinarily developed, as might naturally have been expected. Those who closely observed the animal in life, could not fail to mark the asymmetry in the jaws. I myself noticed it long before I had an opportunity to study it.

What was the cause of this irregularity? The elephant, although not born in captivity, was captured when very young. He was of extraordinary size, and his whole bony system was unusually massive. He had always been of a peaceful disposition, and had not, until his death, met with any serious accident.

A duplicate cast of the jaw was sent to Professor W. H. Flower, director of the Natural History Department of the British Museum, author of "The Osteology of the Mammalia," etc., and perhaps as competent authority as now lives upon the subject. He gave his opinion in a letter, in the course of which he says,—

"The irregularity has arisen evidently from his food not having sufficient gritty particles in it to cause the required and normal wear of the front ones, so that these were not gotten rid of, as they ought to have been, before the others came up to take their places. Elephants in menageries constantly suffer in this way. They ought to have a little sand mixed with their food."

Notwithstanding the eminence of the authority, I am inclined to take issue with Professor Flower upon the etiology of this case. I would not assert that the lack of attrition was not a factor in the result, but I cannot believe that alone it is sufficient to account for the aberration, for the following reasons:

First It is not absolutely certain that the procession of the teeth in Elephas is entirely due to their wear. Certainly that has something to do with it; but if the animal was entirely fed on food that produced no abrasion of their surfaces, it seems to me there can be no doubt that they would be shed. Probably the time might be deferred, but the posterior molars would certainly develop, and to do this the anterior ones must be removed. We know that in the human subject the deciduous teeth are removed with the development of their successors, and that when there are no permanent germs the first ones are usually retained. This would indicate that the absorption of the deciduous roots is due to the development of their successors.

Second. With the wearing away of the crowns there is a development of the roots of the worn teeth in elephants, so that their removal does not depend upon mere attrition,—that, indeed, inducing exactly the contrary tendency. They are absorbed, as are the deciduous teeth in other mammals. It is a part of the mysterious process of nature, influenced by the pressure of the succeeding tooth. That in elephants the eruption and advance is horizontal instead of vertical, does not necessarily change the conditions. Lateral pressure is as effective in inducing resorption as is vertical.

Third. I cannot conceive that the lack of wear of the teeth should affect the structure of their successors. Their form might possibly be changed, as the result of undue pressure upon the formative plates; but this would naturally result in their being crowded together, whereas in the teeth of "Jumbo" the plates are separated by an undue amount of cementum.

Fourth. The relative proportion of the different tissues is completely changed, thus showing that the development within the crypt of the jaw in the early stages was interfered with. Even though the preceding tooth was not advanced it would not induce this aberration, because the anterior plates are formed before the normal time for the advance of its predecessor has arrived.

Fifth. The fourth molars, in the case of "Jumbo," seem to have been considerably worn. The fifth molars are occupying a place anterior to that which belongs to them. They have, it seems to me, unduly advanced. The general appearance is that of teeth that have irregularly developed. It is quite impossible to determine the structure of the posterior plates without making a section of the jaw, as they are yet enveloped in the bone.

Sixth. It is difficult to conceive of food that would cause greater attrition than that which is usually supplied to elephants in captivity. In their native condition they subsist largely upon succulent grasses and shrubs, which in their green state are easily masticated. In captivity elephants are mainly fed upon dry hay, than which few foods could wear the teeth faster, and desiccated grains, the siliceous covering of which must cause great wasting of the tissues of the teeth. It would appear, then, that the amount of attrition in the teeth of a captive elephant should be much greater than in those of one which lives in a state of nature.

In view of these facts, it does not seem to me reasonable to suppose that this abnormality could be caused by lack of gravel in the food of "Jumbo." I should rather attribute it to some injury which he had sustained, and which interfered with the development of the tooth-plates. It might be sufficient to accomplish that without being externally visible. The reversed convexity of the teeth, the change in their morphology, the abnormal development of the alveolus, the malarrangement of the tissues, the distortion in the tooth-plates, all seem to point to this as the predisposing cause. It is possible that the jaw itself is but partially developed. It seems short for an animal of such extraordinary size.

Nothing but an examination of the forming plates, and of the germs of the remaining teeth, will satisfactorily solve this very interesting problem, and it is very much to be hoped that some competent New York comparative dental anatomist will receive the necessary permission, and make a careful study of this unique case. The skeleton will be found in the rooms referred to, at the right in the main entrance hall.

ELECTRICITY: ITS APPLICATION IN DENTAL PRACTICE.

BY ALBERT C. WESTLAKE, D.D.S., ELIZABETH, N. J.

(Read before the annual meeting of the Dental Society of the State of New York, May 12, 1892.)

THE application of electricity in dental practice is destined to become popular after its principles are better known by the progressive dental surgeon. As he delves deeper into the mysteries of this subtle power, he will be animated with the ideal of becoming an electrologist, —that is, to be master of electricity in its physical and physiological as well as its diagnostic and therapeutic relations as applied to the exigencies of his practice.

It affords me great pleasure to be honored in bringing you a paper which deals with such a live subject, and by its presence to represent the desire of New Jersey to keep to the front, shoulder to shoulder with her sister societies, in the advancement of dental and oral science.

To discuss electrology in all its medical and surgical aspects would of course require a large series of papers.

I will confine this article to its practical application in our dental offices,—assuming the privilege, however, of first presenting a summary from the authorities* of the leading principles of electro-physics, —that is, the science that treats of electricity in its physical aspects,— then introducing electro-physiology and therapeutics, electro-surgery, and electro-medication. All modern research tends toward the conclusion that the different forms of electricity, which are variously distinguished as magnetism, galvanism, etc., are but expressions of one force, which force is correlated to the other great forces of nature, heat, light, etc.

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* Rockwell's Medical and Surgical Electricity.

Electrical force, like light, is everywhere being generated and everywhere acting. The play and interplay of electrical phenomena are incessant and infinite.

We see in electro-physics many illustrations of the transmutation of one force into another. If we start with heat, we find it produces electricity, and through electricity produces chemical action, manifesting light. If we start with magnetism, we find it produces electricity, heat, chemical action, and light. If we start with chemical action, we find it produces heat, light, and electricity. If we start with electricity, we find that it produces magnetism, heat, light, and chemical action and motion.

The basis of all electrical measurement is Ohm's law, which is, that the current passing through any point in a circuit varies directly as the electro-motive force and inversely as to the resistance. We may illustrate this law by supposing a current of water passing through an ordinary syringe. The quantity of water that flows through the tube will be directly proportioned to the force with which it is urged forward by the piston and inversely as to the resistance offered its passage. So in electricity the useful effects of the electro-motive force are diminished by having to overcome resistance both of the source itself and the conductors it traverses.

The unit of electro-motive force is called the "volt," after Volta, the Italian philosopher; the unit of resistance is called "ohm," after Ohm, the German mathematician; and the unit of current strength is called "ampere," after the French philosopher. The unit of resistance divided into the electro-motive force equals the ampere or current. These three main laws are the standards governing electrical measurement in fixing a battery and circuit.

Electricity always moves from the higher to the lower potential. To transfer heat from one substance to another, those substances must be of different temperature. It is so with electricity. To introduce a current, it is requisite that the two points to be united by any conductor shall be of different potential: as an illustration, the positive and the negative pole. Suppose we consider the center of this box from which the current is transmitted, zero; then the positive pole will be plus (+) and the negative minus (—).

We assume the difference of potential, or the power of overcoming resistance between the poles, to be 100 units; I have the poles in my hands. The potential at the positive we will say is + 50, and that of the negative — 50. The potential will fall regularly along the resistance from the positive pole and rise regularly from the negative pole, until both meet in the center of the resistance of my body. The center of resistance of my body is not necessarily an anatomical center, as the resistance of the different parts may and does vary. This point is illustrated in the position and extent of the body between the electrodes. When one electrode is held in the patient's hand, and the other applied to the tooth or gum, the resistance to the current by the body is of course greater than if the electrodes were close together.

At our present stage of experiments, we assume that it takes twenty times more pressure to overcome the resistance in the tooth than in the soft tissue. The conductivity is also modified by age, temperament, and the nature of the disease. Hence greater quantity is used for one advancing in years over a young person, and a lymphatic and bilious temperament over a nervous or sanguine. It is quantity that decomposes chemical substances as water, salts, etc., and that accomplishes, by its proper regulation, the therapeutic effects.

Electricity does not by its direct action leave any more electricity in the body than it finds there. If it increases or diminishes the natural electricity of the body, it is indirectly through the effect of the properly regulated current passing through the tissue and improving nutrition. The length of the application is also to be considered; also the differential action of strong, medium, or feeble currents.

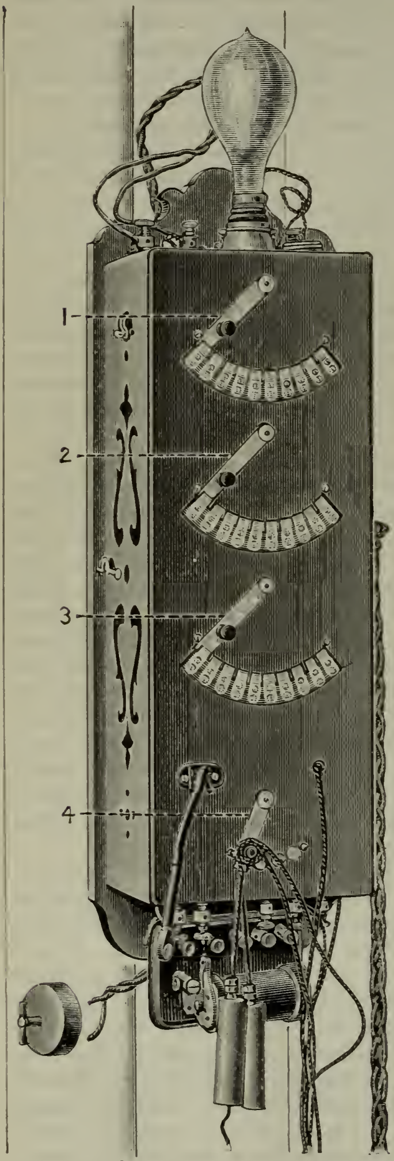
The difference in the conducting power of electrodes is considerable. A metallic electrode conducts much better than a sponge; flannel conducts better than a sponge, but not as well as a metal. A current that is painful when applied by a metal, and quite perceptible when applied by a flannel or chamois-skin, is hardly noticeable when applied by a sponge. The painfulness of a current is modified by the extent to which the current is diffused. A large, broad electrode will conduct more than a small, narrow one. The external resistance depends also on the quantity and quality of the liquid used to moisten the electrodes. Warm water adds to its conductivity, and warm salt water best of all. Under firm, close pressure, the conduction is better than with light contact.

In our dental practice the object is necessarily localized electrization, which is accomplished by placing the electrodes so that the current in passing from one to the other shall chiefly traverse the particular part that is to be affected, so far as we can control it. The effect of both the faradic and galvanic currents, however, extends directly or by reflex action to parts beyond the circuit. These currents have often been confused in their physical and physiological effects. They are of course the same force, electricity, only a difference in potential and quantity. For either to be applied successfully, the operator must be competent to diagnose or decide which to use. Thus if merely an intermittently contractile (or stimulative) effect on muscle is desired, the use of rapidly interrupted current at high pressure (such as is obtained from the secondary wire on a faradic coil) is indicated; while if a cataphoric effect is desired, a current of volume is necessary. The operator must also have the current under complete control in both pressure and volume.

In the apparatus here shown, which is devised by my electrician, Mr. George M. Wheeler, of New York, and founded on scientific principles, I use the current for various purposes. Regarding the difference in volume, I may state that as small a current as one milliampere—that is, one-millionth of one ampere—is led from these posts, while from the two posts, "the cautery terminals," as much as eighty amperes is drawn. The upper switch regulates the amount of current at different pressures given to my cautery electrode. One of the great advantages derived from using the current in this manner is that snares will not burn out from abnormal flow of current caused by shortening of the snare, and one is not obliged to insert resistance to compensate for the reduction in snare resistance, as is found necessary where current is derived from a battery.

The second switch serves to operate any smaller instruments, such as mouth-illuminator, mallet, hot-air syringe, and water-heater. Six different current strengths can be given the mallet by simply sliding the switch-arm. Thus the force of the blow may be varied without putting the instrument out of adjustment.

The third switch varies the speed of the noiseless reversible motor. The treadle connector controls the starting, instantaneous stopping, and the rotating direction of my motor. This switch also varies the current delivered to my faradic coil, and the galvanic current to the terminals on the bottom of the box. The last switch throws in galvanic or faradic currents, singly or combined, to the electrodes as desired.



As far as my experiments extend, I find that a very fine or faradic or rapidly interrupted current has more marked effect on the sensory nerves than a coarse or slowly interrupted or galvanic current. This is to be considered in the treatment of local anesthesia and neuralgia, the mild current having a soothing effect. Again, the negative pole has a much stronger effect both on the sensory and motor nerves than the positive. One can readily distinguish the poles, when held in the hand, by the stronger sensation and more violent muscular contraction which is felt at the negative.

I prefer the faradic in the majority of treatments on the mucous membrane and skin, also in the stimulation of the pulp. It has direct action on the circulation, the caliber of the blood-vessels being narrowed through the action on the vaso-motor nerves. This contraction is spasmodic, and gives way in time to normal circulation.

I present this subject to the profession as one of vast possibilities. I am convinced that the problem of obtunding sensitive dentine will be solved through the agency of electro-medication or cataphoresis. This theory, as applied to other tissue, was promulgated by the French scientists fully fifteen years ago. My experiments in this line are, at the present writing, not very extensive, but the favorable results obtained encourage the hope that after the differential actions of the two currents on the bone are thoroughly understood, and the decision made as to the drug or drugs to be used, the pain that our patients experience when a cavity is being prepared will be reduced to a minimum. If the positive and negative poles are brought in firm contact on the gum at both sides of the root or tooth to be extracted, the end of these electrodes being in the form of a cup or saucer, within which is placed sponge or cotton saturated with a four or six per cent. solution of cocaine, or absolute alcohol, ether and chloroform combined, or some other properly selected vegetable anesthetic, and the current turned on gently to the required degree, this preparation can be forced into the tissue sufficiently to cause local anesthesia. The galvanic current required is from two to thirty milliamperes.

I will report a few experimental office cases:

Case 1.—Mrs. J., age thirty-four, nervo-sanguine temperament. The two cuspids on superior arch presented labial and approximal cavities. The dentine was hypersensitive, and there was slight recession of the gum. Before applying the rubber-dam, I gave her the negative electrode to hold in her hand, and fitted a thin wire of silver in one of Kidder's universal holders, attached to the positive pole. I wound a few threads of cotton around the wire, and saturating it with a ten per cent. solution of cocaine, applied it to the margins of the gum. I first passed about one milliampere of current, and gradually increased it to four, which I continued for less than two minutes. I then adjusted the rubber-dam, pressing the gum well up, with no apparent pain to my patient.

Before excavating the cavities, I saturated cocaine crystals with ten per cent. solution of warm carbolic acid, into which I dipped the cotton on the positive electrode, and found that after applying about eight milliamperes of galvanic current for fully one minute I could prepare the cavity without the patient protesting. I joined these cavities in each tooth, making almost a circle, and filled them with gold by aid of the electric mallet. She does not appreciate the thermal changes complained of before filling, and the teeth are comfortable.

Case 2.—Mrs. K., age twenty-nine, nervo-bilious temperament. A right superior second bicuspid had developed an alveolar abscess, during pregnancy, about fourteen months ago. There had been repeated treatments since her confinement, but considerable tenderness remained at apex of root, and there were at times severe neuralgic pains. She came to me for treatment, and although the canals were well cleansed and the tooth filled, yet the pains continued at intervals. I saturated cotton on the positive electrode with equal parts of iodine and aconite, and applied it to the tender point indicated on the gum. I applied up to about twenty-five milliamperes of faradic current, and after two sittings, with intervals of two days, the pain disappeared, and the parts are in a normal condition, and have remained so up to the present writing, over one month since the first application. She said that her dental surgeon had applied iodine and aconite several times, and had given her a bottle with instructions for use. I am led to infer that the successful result obtained was due, in part at least, to the stimulative effect of the current.

Case 3.—Miss B., age twenty-four, presented extensive inflammation of gum on inferior right maxilla. The parts surrounding the twelfth-year molar, and slightly involving the sixth-year molar, were so swollen that it was difficult for her to open or close the mouth. The swelling extended and included the tonsil on that side. She had been advised that the twelfth-year molar, which was filled, was the cause of the trouble; but I was convinced that it was a case of impacted or delayed eruption of the third molar,—having located the other three,—and also felt assured that there was room for it to erupt. After saturating the cotton, as in Case 2, with fifteen drops of iodine and aconite, I applied it firmly over the inflamed tissue. I began treatment with about four milliamperes, which was gradually increased until the patient felt the current quite powerfully, and then dismissed her and made an engagement for the next day, when to my great pleasure, and her own as well, the swelling was barely perceptible. The pain disappeared within four hours after the application. I then lanced the gum posteriorly to the twelfth-year molar, and advised a wash of Listerine. The third molar is now erupted, and the parts are in normal condition.

These are typical cases. The treatments can be modified as the circumstances suggest. For sensitive dentine I have used cocaine crystals saturated with warm solution of oil of cinnamon, aconite, etc., and had success, using the positive pole and galvanic current with from four to ten milliamperes. The first requirement, as in all cases presented, is to be careful in our diagnosis. The experiments will necessarily be tedious until, by repeated use of the milliampere meter and a minute appreciation of the resistance offered by the tissue in our different patients, we are enabled to prepare an average application of current.

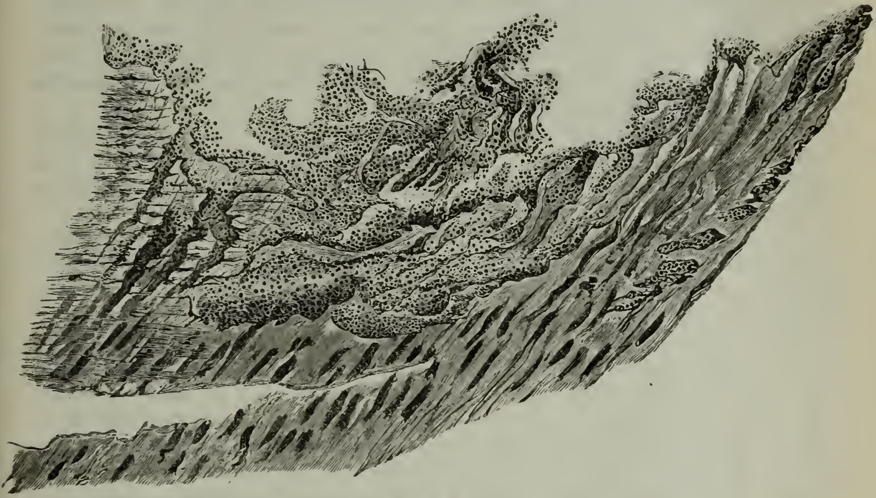
MICROSCOPIC EXAMINATION OF A CASE OF CARIES OF A MONKEY'S TOOTH.

BY W. D. MILLER, M.D., D.D.S., BERLIN.

It is well known that the Quadrumana are not exempt from decay of the teeth. Particularly in captivity they are by no means infrequently subject to this disease. I doubt, however, if many are aware of the terrible havoc sometimes wrought upon the teeth of these animals by decay; nor has, to my knowledge, a microscopic examination of the decayed tissue ever been made.

It is not difficult to find traces of caries in every collection of apes' or monkeys' skulls, but some of the most pronounced cases I have ever seen are in the possession of Dr. Barrett, of Buffalo,—among others, the skull of a monkey from the London Zoological Garden, in which every single tooth with the exception of the lower incisors is decayed. The right superior central incisor is decayed to the pulp, and one-third its length broken off; the left superior incisor is a complete ruin, and shows evidences of alveolar abscess. Other skulls show ravages quite comparable to the worst cases of decay seen in human dentures, complicated with diseases of the alveolar process, abscess, necrosis, antral troubles, etc.

I have in my possession the skull of a monkey, which was presented to me by a former pupil, Zahnarzt Sietas. The twenty-seven teeth now present show fourteen cavities of decay. Particularly the masticating and buccal surfaces of the molars are attacked ; also the approximal surfaces of the incisors, the lower centrals being decayed on both approximal surfaces. I obtained material for microscopic examination from one of the molars by placing it for twenty-four hours in water to soften up the dry tissue. I was then able to scoop out a piece of the decayed dentine with a spoon-shaped excavator. This was at once cut on the freezing microtome, and stained by the Günther modification of the Gramm method. A section under a power of about 500 diameters is reproduced in the accompanying figure.



Carious Dentine from a Monkey's Tooth. Circa 500 : 1.

It will be seen that the same appearances repeat themselves here that have been found in human teeth, both living and dead, in caries of horses' and dogs' teeth, etc. In the deeper parts we find the tubules crowded with bacteria and much distended ; nearer the surface the basis-substance is broken down, the tubules melted together, and the whole mass of the tissue in a state of dissolution. In the case before us the destruction has been effected chiefly by micrococci ; only at isolated points a few bacilli may be found by careful examination under the microscope.

Anti-Conservative Treatment of the Exposed Dental Pulp.

BY CHARLES HARKER, D.D.S., MT. HOLLY, N. J.

(Read at the joint meeting of the Pennsylvania and New Jersey State Dental Societies at Cresson Springs, Pa., July 21, 1892.)

Mr. President, and Members of the Pennsylvania and New Jersey State Dental Societies :

With diffidence and much reluctance I consented, a few weeks since, to read a paper before the joint meeting of these two intelligent and learned bodies of men ; with diffidence, because unaccustomed to appearing before public audiences ; with reluctance, because of the fear entertained that I might not be able to do credit to the well-earned high standing of the New Jersey State Dental Society and the wisdom of its executive committee in representing them. Feeling, however, as a member of our society I owe it the duty of my best endeavors, it has been a pleasure for me to group together some thoughts upon the somewhat hackneyed theme of pulp-treatment.

The fact that this subject has been much written upon proves its importance; furthermore, it shows that there is no definite settled method of dealing with the exposed dental pulp.

Notwithstanding we have heard it stated with emphasis that in society meetings of this kind we should discuss *principles*, not *practice*, I have chosen this subject, and shall endeavor to treat it practically; believing that, while principles and practice should never be entirely divorced, we owe more to the benefits of practical discussions than those involving general principles.

The title of my paper makes clear the fact that, with me, the method of treating exposed pulps is the radical one. To this method I was driven by my almost universal failure in pulp-capping and palliative treatment previous to the last five years.

During the last five years I have devitalized more than ninety-five per cent. of all exposures presenting in my practice, with no percentage, so far as I know, of failures to record. If, therefore, I have been successful in any department of practice, it is with these most difficult and perplexing cases. I say most difficult and perplexing, although, if we read over the articles on conservative treatment which have appeared in dental journals during the last decade, we may conclude that the dental pulp is the most manageable and accommodating of vital tissues. I do not wish to say anything that will reflect upon what has been written or said in discussion upon conservative treatment, or that may seem to laud a method (I will not say my method) of successful practice by devitalization; but I would present the facts fairly, as they have presented themselves to me during an experience of about ten years of busy practice. I am well aware that I shall be arraigned by the able conservative advocates present for my so-called wholesale destruction of vital organs. Be this as it may, I must state my convictions, based as they are upon my own experience.

When I state that I devitalize ninety-five per cent. of all exposed pulps presenting in my practice, with no percentage of failures, I do not wish to be understood as claiming entire immunity from trouble subsequent to devitalization, extirpation, and root-filling. Teeth having abnormally formed or compressed roots, constrictions, nodules of dentine in canals, pulp-stones, etc., present difficulties not unsurmountable, but requiring skill and patience for their successful treatment. I do assert, however, that by faithfully following the line of treatment which I shall suggest, neither the operator nor his patients will have very much of which to complain. In my practice, in less than one per cent. of the teeth operated upon has there ensued irritation of a nature serious enough to require removal of the permanent filling; and in these exceptional cases subsequent treatment has resulted in restoration to comfort and usefulness. In no case do I recollect an abscess having formed subsequent to root-filling following extirpation of the pulp.

On the other hand, my experience in capping the fully exposed pulp, due to extensive caries, has been almost always followed by pain to the patient and trouble to myself or my neighbor dentist, with disaster to the tooth within two years, unless the pulp was promptly devitalized, removed, and the root-canal properly filled. I say disaster to the tooth, because, when the tooth is left to absorb the putrescent products of a decomposed pulp, the tooth-tissue itself suffers irreparable injury ; not only in appearance, but structurally as well. It is indeed a rotten tooth. The dentinal tubuli having become saturated with the gaseous and sanious products of decomposition, the basal structure altered, the enamel discolored, checked, and brittle, we have a tooth unwholesome to its surroundings, and infinitely inferior in strength and comeliness to the tooth whose exposed pulp has been extirpated at sight or devitalized by the usual process, removed, and the subsequent operations of root- and crown-filling completed properly and at the right time, in which case the strength, color, or structure of the tooth are but slightly affected, and appear not to affect its surroundings at all.

I have two teeth in my own mouth whose pulps were devitalized, roots filled with creasoted cotton, the crowns with amalgam, twenty-two years ago. After the lapse of twelve years, the fillings, having become defective, were removed and the cavities refilled, until which time I did not know the pulps had been devitalized ; and, with the exception of a little peridental irritation in one of them at the time of refilling, due to the unnecessary removal of root-filling to substitute a solid filling at the apex (in most cases a bad practice), the teeth and surroundings have been perfectly healthful and useful. They appear now to be good for at least a score more years of active service. I could give instances of teeth having been treated likewise, in which more than forty years of uninterrupted health and usefulness have been enjoyed. Most dentists, however, I think, have now improved upon this old method.

Notwithstanding cases similar to these frequently come under our observation, I do not claim that pulps should never be capped. In traumatic cases, when the excavator has accidentally punctured the internal dental membrane, or when accidental fracture has occurred, slightly exposing the pulp, capping should be practiced, especially as cases of this nature are usually the more favorable ones,—those of young patients.

Magitot, in his treatise on dental caries, not only tells us, but clearly demonstrates by beautifully illustrated cuts made from microscopic sections, the pulp complications in those cases where no exposure, or even near approach to it, exists. Capping with oxyphosphate or oxychloride, to which is added about one part carbolated vaseline to ten parts of the oxide, in these cases conduces very materially to conservation of the pulp's vitality ; and yet, more or less frequently, we all have pulps to die when capped under these most favorable circumstances. Whether we attribute loss of vitality to the continued irritation due to previous caries, the impingement of secondary dentine which nature has furnished for the benign purpose of forestalling exposure, thermal changes, "taking cold," or what not, the result is the same, proving that instead of being easily manageable, a tooth-pulp is so treacherous that we can never predict with certainty the results of a capping operation.

The capping operation is based upon a most beautiful theory: there are many beautiful theories that do not work well in practice. I have always been in the habit (it may be a bad one) of uncapping all capped pulps coming from the hands of other dentists into my hands for treatment; that is, when refilling has become necessary or disease is apparent. In this way I gain certain knowledge of the conditions present at the time of my operation, which it seems to me can be gained in no other way.

In almost every case in which the tooth has remained comfortable, I find no real exposure exists or ever did exist. A small percentage of these, however, have quietly succumbed, especially those in which the regular oxyphosphate mixture has been used. Cases in which real exposure existed at the time of capping, I have usually, though not always, found dead. When alive they appear very much as before the capping, more or less diseased, but apparently resisting progressive diseased action, while the vital forces are strong in the individual, but ready, whenever systemic changes occur reducing vital force, to take on an acute local inflammatory condition resulting in death *en masse*.

I am aware that those who advocate conservative treatment claim by a little properly directed antiphlogistic treatment to be able to allay all irritability; but to my mind the treatment of an inflamed tooth-pulp by leeching, cold applications, purges, etc., while the irritant (the plug) remains *in situ*, is too absurd to need comment. The above treatment may be *scientific*, but if the scientific dentist had himself undergone a capping operation, and in a few weeks the dental organ began showing signs of developing into what Shakespeare terms "a raging tooth," I can imagine him *commanding* the cold scientist to "throw physic to the dogs," and get at the offending pulp instanter, dead or alive.

I have yet to find the first instance of a previously exposed pulp, due to caries, having itself, after capping, wrought out physiologically the theory which the capping process promises, or rather, I should say, the result which the conservative advocate promises for the theory. That this physiological deposit ever takes place after *caries* has caused a rupture of the pulp-membrane, is still a question. No one, I think, would assert that the pulp ever *does* return to a perfectly healthful normal condition. That it may after exposure due to traumatic cause, it is more reasonable to suppose. In the former instance we have a condition akin to that in an ordinary sore, which, having sloughed, can only heal by granulations. In the latter, I see no reason why the accidental rupture might not heal by first intention.

In my experience, as I have said, the membrane when ruptured by caries does not heal at all; when uncapped it always presents a raw surface. I have, however, in a number of instances accidentally punctured the pulp in excavating, and having capped and filled with cement, after the lapse of a year or more, upon uncapping I have found no exposure existing, calcific matter having formed under my cap. Under the calcific deposit I have no doubt cicatricial tissue had formed, occluding the puncture of the pulp-membrane.

In the case of a girl, ten years of age, having by a fall broken off the mesial corner of a superior central incisor, exposing the pulp so that it bled slightly, I at once capped and built out to the original contour with gold. Five years afterward, while playing at school, she again fell, breaking away the entire filling. Upon removing the cap, I found this pulp beautifully protected by a secondary deposit of well-formed tooth-bone. I consider this a case of healing by first intention, the ruptured membrane having united ; and similarly to the periosteum in case of a broken bone, it afterward elaborated the secondary tooth-bone.

These cases, though interesting to study, do not come under conservative treatment in the usual acceptation of the term. I merely cite them to show the distinction, and also to show that we *must* have the ruptured membrane reformed before we can have its function restored. Experience proves that after rupture by caries it does not reform ; it cannot, therefore, produce the secondary deposit claimed by the advocate of conservative treatment.

Since this paper has been in course of preparation a patient has visited my office, in whose lower jaw I found six dead teeth, whose pulps had been well and scientifically capped previous to their demise, by an eminent Philadelphia dentist. Another case had been treated, in which mouth I found three suppurating abscesses, with another tooth in the incipient stage, the results of well-capped pulps. I might enumerate other cases not so recently treated of patients coming from other states, which are equally striking illustrations of disaster resulting from unwise but well-meaning endeavors at pulp-conservation on the part of otherwise successful practitioners. I do not cite these cases of failure in a spirit of unkindly criticism of the operators to whom reference is made,—they are men of infinitely greater attainments than your essayist. I only wish to show that the best have failures, *very many* failures, on this line, and that we *cannot* conclude that these ill results are due to soil, climate, or the dentists of a given locality.

I am not an extremist. I do not believe, with some, that the whole office of a tooth-pulp has been performed when it has finished the construction of the tooth in which it is located. On the contrary, I believe its function never ceases while it is in comparative health. It continues to nourish the dentine, and under some circumstances to elaborate secondary dentine, notably when the pulp is being encroached upon through mechanical or chemico-mechanical abrasion, and when caries is threatening exposure. I do not, therefore, wish, nor would I dare to claim, that a dead tooth is as good as a live one, other things being equal. I advise, and, as I have stated, practice protecting the pulp as long as there is any reasonable hope of aiding it in the continued performance of its healthy function ; but when exposure has resulted from carious action, I consider that in *all* cases the greater certainty of freedom from further pain, trouble, and expense to the patient, annoyance to the operator, and the greater security of the filling,—thus insuring preservation of the *tooth*,—more than compensates for loss of vitality of the pulp, especially as I *know* the tooth may be preserved comfortably to the patient by devitalizing it. In other words, I believe I practice conservative treatment of *teeth* by non-conservative treatment of the diseased pulp.

I ask you, is this not good surgery? In the practice of general surgery, does the surgeon hesitate to destroy the diseased *part* of an organ, if thereby the function of the *whole* may be preserved?

Should we, then, as special surgeons, hesitate, especially as we, unlike them, are able to substitute artificially the lost part so perfectly that our patient feels, sees, or knows no loss?

The practice of dentistry is very largely special surgery, and no other kind of surgery requires such delicacy and accuracy of manipulation as does the successful practice of dentistry. We have much less to hope for from nature's processes, and consequently much more depends upon our own efforts and operations. The dental surgeon is of *necessity* either a most accurate workman or else a failure. The operations involved in dealing with exposed pulps, whether by extirpation or capping, call for exquisite skill and nicety; careless or indifferent operations will fail in the former sometimes, in the latter always. Indeed, upon the exercise of judgment and skill in this department, toothache cases, depend very largely the numbers of our patients; it is vital to our success. How, then, shall we treat them? Two methods are open: palliative and radical. Upon the former we have dwelt sufficiently at length; the latter I will now endeavor briefly to describe as I practice it. There may be nothing *new* or superior in it, but when thoroughly performed it *is* successful. The teeth do not to any extent check, chip, break, discolor, or give other annoyance to patient or dentist.

These patients call *always* without previous engagement, and at a particularly busy time, suffering with toothache either from a freshly exposed nerve, or one upon which our neighbor dentist has placed a plug to "save it alive." Upon some days there appears to be an epidemic of these cases, and I am not quite sure that what appears to be is not really true. Atmospheric changes do greatly conduce to the discomfort of these patients. However busy we may be with previous engagements, the sufferer regards it (perhaps justly) as altogether inhuman if we do not at once attend to his wants. We do not, therefore, stop to argue the question of rights and privileges, but, leaving our patient and stepping to another chair in which the sufferer has been placed, remove the plug, or, if it is a fresh exposure, the decomposed dentine, and put the exposed portion of nerve in a pickle of pure carbolic acid for about two minutes, then cover with sandarac and cotton, and dismiss until the next day, at which sitting the previous medicament is removed, and the arsenious acid applied directly to the exposure, sealing again with sandarac and cotton.

I request the patient to call on the fourth day, when the arsenic is removed, the pulp entirely uncovered, and a portion excised, bleeding it freely to prevent pinking of tooth during the waiting time, about three weeks, while nature is deciding how much of the pulp she will give up. I then place in the pulp-chamber (from which the pulp has been excised) a piece of dry absorbent cotton carrying as much as it will of iodoform powder, the piece of cotton being large enough to fill the pulp-chamber only. I then fill the cavity, which has been kept dry, with a temporary gutta-percha stopping until the final operation, when I place the dam upon the tooth, and extract the pulp from the root or roots. With a No. 7 or No. 8 uncut Swiss broach having a perfect taper point, I work a mixture of campho-phenique, iodoform, and zinc oxide to the apex, followed, after absorbing the fluid in the canal, by a tiny fiber of dry cotton carried as nearly to the apex as the previous mixture will allow without painful pressure.

This procedure insures carrying without pressure a bland sterilizing apical stopping entirely to the imaginary "apical space"; that is, to the border line separating devitalized dentine from living cementum and its investing membrane.

Removing with a broach the fiber of cotton, and drying the canal as thoroughly as possible with a cotton-wrapped broach, the remainder of the canal, when of normal caliber and formation, is filled with a gutta-percha cone made to fit the canal, the point of the cone having been moistened with chloroform previous to introduction. The apical portion of the canals in two-rooted bicuspids, compressed anterior roots of lower molars, and other tortuous or constricted canals, may, by using No. 7 *slender* Swiss broaches, usually be well filled either with the antiseptic material I have indicated, or with chloro-percha.

Except for the removal of adherent and other calcific deposits, I never ream canals more than may be done with the ordinary bud-shaped excavating burs; canals which may be reamed without too great danger of going through the side of the root, or the breaking off of the reamer, may be well filled without reaming. Nicely tempered slender broaches adapt themselves without danger of breaking; reamers do not.

There is a field for the exercise of judgment in removing or overcoming the occasional difficulties of the apical territory, which perhaps no written description would cover, but which the cultivated judgment and touch, together with delicately formed and properly tempered instruments, will enable us to surmount with comparative ease.

Some of these exceptional conditions would have caused trouble and ultimately death, had the pulp been capped and the capping operation *itself* been successful. The difficulties must, then, be met under conditions and circumstances very much exaggerated, or the tooth lost.

I do not remember ever having heard mentioned the method of approach which I use in distal exposures of lower molars (sometimes I use it in the upper), and would here call attention to it: viz, by cutting away the posterior buccal corner as far as the buccal seam (instead of the usual drilling through the buccal wall), the access of light, the line of vision, directness of approach, and movements of instruments are less obstructed. I think you will also agree with me that in addition to facilitating the whole operation, a tooth so treated is stronger than when prepared and filled in the usual way. I sometimes demonstrate to students this, which I consider the most difficult case, and perform the operation of extirpation, root-filling, and contouring of crown with amalgam in forty-five minutes.

If the arsenic has been well triturated, the proper dose used, the pulp well exposed before applying, the sandarac bottle warmed before using, and no pressure made upon nerve in sealing up, there will very rarely be any pain from the application, and no danger from the effect of arsenic upon the peridental membrane, either about the apex or gingival margin or the gum.

In case the effects have not reached throughout the whole extent of the pulp (which case seldom occurs), I remove the portion of pulp devitalized, reapply minute quantities of paste, one part arsenious acid to ten parts iodoform, moistened with campho-phenique, or else anesthetize locally with cocaine, and remove.

I much prefer removing the entire pulp to the apical constriction; but if unable to do so, no harm will come from leaving in the canal the slender apical fifth of pulp, whether dead or alive, provided the antiseptic filling I have recommended be well picked into it; if not dead it will die, become mummified, and make a fairly good apical filling.

When trouble does ensue after devitalization, it is from one of two causes: either peridental irritation arising from an overdose of arsenic, the inflammation set up by the drug passing, by continuity of pulp-tissue and membrane, through the constriction, and involving the external membrane reflected over the apex, an almost immediate sequence; or else it is due to ultimate disintegration and evolution into septic gases of unsterilized shred-like portions of the pulp remaining in the inaccessible portions of tortuous or restricted root-canals.

In my experience, the former difficulty rarely occurs, and always subsides in a few days without treatment. I have already referred to the infrequency of the latter. When it does occur, it is of more serious nature; but its consideration would take us into treatment of incipient abscess,—a discussion beyond the legitimate compass of my paper. I will therefore conclude with the statement that to be successful we must carefully forestall these complications, or else combat them successfully should they arise. I have intentionally omitted any mention of the treatment of temporary teeth, fearing my paper is already too long. It should be modified to meet the difference in conditions: sometimes the treatment is extraction, sometimes palliation in the deciduous when it would be radical in the permanent teeth.

REMARKABLE SEQUENCE OF OPERATION FOR NECROSIS AT BASE OF SKULL: A NEW METHOD OF RESECTING THE THIRD BRANCH OF THE FIFTH NERVE.

BY G. LENOX CURTIS, M.D., D.D.S., SYRACUSE, N. Y.

(Read before the American Medical Association, at Detroit, Mich., June 9, 1892.)

ABOUT a year ago a case came into my hands for operation which presented unusual features of interest from the surgical standpoint,—not merely on account of the immediate results, but because of the suggestion which it afforded of a decided improvement in an important surgical operation.

In May, 1891, the patient, Miss M., aged thirty-five, a professional nurse by occupation, presented a note from Charles M. Magee, M.D., of Syracuse, N. Y., asking me to make a careful examination of her symptoms and condition, and stating his opinion that she had been suffering for the preceding five months from confined pus somewhere at the base of the skull. He had, the note added, sent the patient to her dentist some two months before, but no trouble was found, though on the day previous to her coming to me the dentist had discovered pus coming from around one of the teeth.

The right side of the face was considerably swollen,—so much so, indeed, that the eye on that side protruded from its socket. The sight of the eye was, however, normal, while the left eye, which retained its normal position and was apparently not involved in or related to the trouble which had forced its companion out of position, was almost totally blind. With the right eye closed, the patient could merely distinguish the difference between daylight and darkness. Questioning her, it was brought out that, as far as she knew, she had never had the use of the left eye. She had first detected the fact that it was useless to her at the age of seven years, and she had always supposed that its cecity had dated from her birth. She had no recollection of any traumatic injury to which the disability of the eye could be referred. Clearly there could be no connection between the present condition of the patient and the blindness, which was therefore dismissed from the consideration. The history of the case, from the time serious symptoms were first observed, is perhaps best told in the following statement of the patient :

"First appearance of head-trouble was in the latter part of January, 1890, when I had an attack of *la grippe ;* was confined to bed two days,—in the house a week. Had more or less headache afterward, but no serious trouble until July of the same year, when I was taken in the night with a severe chill, followed by headache and boneache. There was also a watery discharge from eyes and nose, and I lost all sense of taste and smell. Did not seem to get over what seemed to be a cold in the head, but about the second week after the chill took a case. The pain and fullness seemed to increase until, on the fourth day there, was obliged to take to my bed. Had more or less earache and faint turns, and was brought home on my bed. Expected to have an operation performed, but after reaching home it was decided that this was not best. Was confined to the house with this attack seven weeks, and was not able to work until the latter part of October. In January my face was somewhat swollen, followed, in February, by a discharge from the right nostril ; head was relieved as long as the discharge kept up, but when it stopped the pain and pressure were intense."

Examination confirmed the diagnosis of Dr. Magee. On passing the electric lamp into the nostrils and posterior pharynx, marked opacity was observed throughout the entire right superior maxillary region, and extending far back in the direction of the ear, indicating disease of the antrum of Highmore and congestion of the surrounding tissues. The patient's physical condition was so unfavorable, however, that it was decided to defer operation until she could be strengthened for the ordeal. She was accordingly placed for a time on an anti-pyemic diet, with such good results that on June 2 the operation was performed with the aid of Dr. Magee, who also administered the anesthetic, and my regular assistant. The first step was the extraction of the second molar on the left side, the second bicuspid and the first molar having already been lost. The wisdom-tooth, or third molar, was allowed to remain, as its removal was unnecessary, and it would serve a good purpose as an anchorage in case a bridge-piece should be required. A flap of gum having been turned back, the bone was cut away from between the anterior surface of the wisdom-tooth and the distal surface of the second bicuspid, the alveolar process being removed with it, and the cut extending along the buccal surface of the superior maxillary bone about a half-inch. Two-thirds of the greater wing of the sphenoid was found denuded of periosteum.

On entering the antrum, that cavity was found to be entirely filled with multiple mucous cysts, pus, and granulations, but there was no evidence as to the origin of the accumulation. The posterior wall was absent, and the edges of the bone surrounding the opening were rough and dead, showing that necrosis had occurred. In exploring beyond this opening an accumulation similar to that in the antrum itself was discovered, except that it contained no mucous cysts, being composed entirely of pus and granulations, extending as far back as the junction of the sphenoid and temporal, and up on the zygomatic arch. The external surface of the pterygoid process was denuded.

In all nearly a half-pint of diseased tissue was removed. The wing of the sphenoid which was denuded was necrosed, necessitating its removal with the bur and curette. As the necrosis involved the foramen ovale, the nerve and artery were pressed aside to allow of the removal of the necrosis around the foramen. The necrosed bone removed extended over the lower two-thirds of the external surface of the great wing of the sphenoid bone, the zygomatic surface of the external pterygoid plate, and the entire zygomatic surface of the superior maxillary bone, and throughout most of the surface of the antrum, though the necrosis was less marked in this territory. Thorough cleansing was secured with carbolated solution, followed by solution of bichloride of mercury. The entire wound was then packed with iodoform lint, which was not changed until the fourth day. Fever was very slight, there having been only two degrees rise in the temperature, and this subsided upon the re-dressing. The wound was dressed in the same way for two weeks, after which the dressing consisted of injections of bichloride of mercury and peroxide of hydrogen, twice a day, and carbolated solution every two hours. A tube was finally put in, attached to the wisdom-tooth, to facilitate syringing out the closing wound and as a drainage outlet. The patient was able to attend to the dressing herself after four weeks, and the case progressed favorably and rapidly. The wound in the jaw soon closed almost entirely, there remaining only an opening just large enough to pass a pin through with difficulty. There is no deformity of the face. The right eye, with the removal of the cause of its protrusion, has returned to its normal position. The patient's health and strength have been entirely restored, she having gained twenty pounds in weight since the operation, and having a greater degree of vigor than for years previous. She has been able to pursue her accustomed vocation for some ten months.

The remarkable feature of the progress of the case after operation was the establishment of sight in the left eye. It will be remembered that the patient had no recollection of ever having had any degree of useful vision with this eye; that, so far as she was aware, it had been blind from her birth. The first indication of incipient visual power in this eye was observed on the third day. On the fourth or fifth day the patient could count with the left eye, unassisted, the fingers on a hand held at a distance of four feet. In two weeks she was able to distinguish objects with some degree of clearness, and could recognize those about her. By September the sight had strengthened so that she could read the head-lines in a newspaper; two months later even small capital letters were easily read, and gradually, with the aid of a strong glass, ordinary print could be deciphered without difficulty.

This surprising and gratifying result opens up a wide field for speculation as to the ultimate and proximate causes of the previous blindness of the eye, and as well the rationale of the removal of this defect. Little is hazarded in the conjecture that the point of interference with the natural office of the optic nerve was probably at some portion of the optic tract on the right side, since this region was involved in the territory of diseased tissue, and the affected eye was on the opposite side from the lesion operated for. It is, perhaps, not necessary to rehearse here the anatomy of the parts, a brief study of which will show that it is scarcely possible that the malign influence could have been exerted elsewhere.

As to the character of the interference, it would seem to have been in the nature of pressure upon the nerve, producing a form of strangulation, which inhibited the normal function of the optic nerve. The history would lead also to the suggestion that the beginning of the formation of broken-down tissue was made very early in the life of the patient, perhaps from a tumor at birth, which impinged upon the optic tract, and thence extended slowly, passing downward through the spheno-maxillary fissure, and by pressure absorbing and destroying the soft and hard tissues in its course, until the posterior wall of the antrum was broken down and the antral cavity itself became choked with the products, the attack of *la grippe* acting simply as a spark to fire the mine which had been so long preparing. The subsequent train of symptoms is self-explanatory in the light of the condition shown by the operation.

Of course it would be interesting and instructive to be able to determine exactly what was the primal factor in setting up the disturbance. The hypothesis above advanced seems the more reasonable in view of the fact that the idea of traumatism is scarcely admissible. The possibility of adenoids being at the bottom of the mischief may also be advanced, but guesses at the remote origin of the difficulty would now be futile.

It would be vastly more profitable to consider a fact which the operation conclusively demonstrated, namely, that resection of the third branch of the great trifacial at the foramen ovale can be accomplished in a much more skillful manner than that now commonly employed. As is well known, the usual method is to cut from the outside, and the equally usual sequence is an unsightly scar upon the face. In the case described I did not resect the inferior maxillary nerve, but I did curette the necrosed bone away from around it, and I could distinctly see the nerve and most of the bone which was curetted. This would indicate the entire feasibility of reaching the third division of the fifth nerve when it is necessary to resect it at the foramen ovale by operating within the mouth. The parts are as readily accessible as by external operation, the wound heals readily, and no deformity will be caused. In operating after this suggested method it should be borne in mind that wounds in the mucous tissue of the mouth are liable to become niduses for the propagation of infectious bacteria, and it will therefore be necessary to guard against such a possibility by the adoption of the proper precautions. This, however, is no more than is requisite in the external operation.

THE EFFECT UPON THE TISSUES OF THE ORAL CAVITY PRODUCED BY THE INTERNAL ADMINISTRATION OF CERTAIN DRUGS.

BY J. D. PATTERSON, D.D.S., KANSAS CITY, MO.

(Read before the American Dental Association, Niagara Falls, N. Y., August 2, 1892.)

THE importance of this subject can scarcely be questioned by the observant dental practitioner, for he is almost daily brought into contact with certain diseased mouth conditions which are popularly believed to be the result of medication for certain constitutional or systemic conditions. This belief has been so long established, has been so fostered and taught by the physician as well as the dental practitioner, that it would be surprising if errors had not crept into or become coupled with the science of the question.

While listening to the history of cases as given by intelligent patients whose dental arches and surroundings have succumbed to disease, we find in very many cases that the inception of the trouble is firmly fixed in the patient's mind, and is believed to have been the result of certain medicines given for systemic effect, which have destroyed both the teeth and the gums and process which surrounded them. Such remarks as the following are very familiar: "My teeth were perfect until my physician gave me medicine during sickness which salivated me," or "I have taken so much iron that it has decayed my teeth." There are many other drugs which are thought to prejudice the integrity of the oral tissues, but the mercurial and iron preparations receive the burden of blame. The former, because the effect comes to the oral tissues alone through its internal administration, and because the belief in its ravages is so general, will receive attention in this essay to the exclusion of other drugs.

"The form in which mercury is given for the constitutional effect is commonly that of chlorides or iodides. A small dose, say one-tenth to one-twentieth of a grain of the bichloride, is given every three or four hours until the desired effect is produced. The physiological action of mercury is tonic, purgative, alterative, antiphlogistic, and sorbefacient. The metal itself is inert, but by combination with the acids and fluids of the body becomes active, and is easily absorbed, passing into the blood from the stomach, the lungs, mucous membranes, or skin, in each case probably as an oxyalbuminate of mercury. In the blood its effects are tonic in small doses, but in quantity it produces impoverishment, diminishes the red blood-corpuscles, and disorders nutrition. It stimulates the glands of the body, especially the salivary, to the production of pathological secretions. In small doses, administered for a short time, the mercurial preparations are blood tonics, increasing the number of red corpuscles and its general condition. Soon, however, they provoke waste by stimulating the lymphatics, and if the small doses are continued symptoms of so-called mercurial poisoning manifest themselves, and 'hydrargyrism,' commonly called 'salivation,' is exhibited. The symptoms of salivation or hydrargyrism are said to be a fetid breath, swollen and spongy gums, a blue line along the gum-margins, stomatitis, sore and loosened teeth, a metallic taste in the mouth. In extreme cases, ulceration and sloughing occur around the teeth, and the jaw-bone is sometimes laid bare."

The foregoing is in brief a description of the effect upon the oral cavity of the giving of mercury for constitutional effect, as gleaned from medical and dental text-books, and especially from "Potter's Materia Medica and Therapeutics."

My purpose is to study briefly the situation, and to detail some practical experiments testing the truth of some of the usually accepted statements.

Some years ago, having been closely allied with physicians in the care of stomatitis resulting from mercurial poisoning, I began to doubt that the classic symptoms of ptyalism as found in the mouth were *per se* the result of mercury. My attention was first called to "*the blue line*," and text-books signally failed to enlighten me as to why it should be present. Inquiry among all classes of medical practitioners developed a wide difference of opinion about the *blue line*, that invariable symptom of salivation. They declared that it was there, that it was always present in salivation, and that was sufficient for them.

Now, before I knew anything about mercurial poisoning in the earlier years of my practice, I had seen many "blue lines" around gum-margins as the result of a deposit of calcic matter, which disappeared under dextrous use of a scaler; and I asserted that the blue line was caused by calculus, and was not the result of mercury *per se*. I asked physicians to explain physiologically the presence of this blue line, and the only explanation was from an ignorant practitioner, who asserted that it was caused by the presence of finely divided metallic mercury gathered there from terminal vessels,—a thing utterly impossible, as mercury internally administered cannot reach the gum-tissue in any such form.

I then agreed to entirely obliterate in a single operation such blue lines in any patient brought to me, the patients to be chosen from those who were salivated by prolonged administration of mercurials. In this I was successful.

Finding that the "blue line" was a result of local conditions only, I then began to experiment upon the "inflamed and spongy gums" in salivated cases. I solicited cases of this kind, and stipulated to cure them without withdrawing the mercurial doses if the physicians desired still to continue the mercury-giving. The result was perfectly successful. Under careful removal of all irritant matter, and the institution of perfect hygienic and antiseptic conditions, all swelling and ulceration, save that which was clearly syphilitic, in a few days would disappear: this too, as has been stated, without withdrawal or lessening of the dose of mercury. These experiments, which were carried on for about two years, were made possible from the fact that there were accessible a large number of patients suffering from the specific syphilitic taint under care of specialists.

The conclusions then reached, and which have since been verified, were that "the blue line," "the inflamed and spongy gums," and other of the more serious appearances were the result largely of local irritation, and not of the mercury; that, with proper care, these symptoms which have been and are characterized as symptomatic of mercurial poisoning, may be entirely prevented.

In the condition of salivation we find the oral cavity unusually predisposed to the gathering of local irritant matter. There is an enormous, unusual secretion of vitiated saliva, and the precipitation of calcic matter is much increased. All the buccal secretions are unhealthy, and the condition demands more thorough hygienic care, and usually in such cases receives less ; therefore the oral tissues fall a prey, not to the mercury, but to the intensely morbid local condition which the salivated condition has rendered possible. It is a condition similar in some particulars to that of the oral cavity in the case of pregnant women. The teeth fall a prey to decay in an unusual manner,—not because they are softer at that time, but because "they then need more care and receive less." The fermentative processes are much more active, and the care is in inverse ratio to the needs.

Every observant practitioner must have noticed how closely the condition met with in irritation from calcic matter where there is no mercurial suspicion resembles the condition described in salivation. There is the blue line, the inflamed and spongy gums, sometimes covering the teeth, and ulceration of the gum-margins. The impoverished condition of the blood and the profuseness and character of all oral secretions constitute the chief difference. The unusual and malignant results sometimes occurring in salivation, and which do not appear in calcic irritation, may be safely laid to the unusual predisposition or to the syphilitic condition which usually precedes the giving of mercurials. Indeed, Dr. Ringer, in his "Hand-Book of Therapeutics," says that the phenomena ascribed to mercurials are similar to those which will result from syphilis ; and may it not, then, be true that the extraordinary symptoms referred to may be entirely due to the specific poison for which the mercury is given ?

The whole question is one of interest and practical value to both dentist and physician. So long as the mercurials hold such an undisputed and merited position in therapeutics, it is of first importance to ascertain, if possible, just what are the evil results following their use.

It has been the purpose of this paper to show that some of the classic signs of mercurial poisoning which appear in the mouth are not symptomatic, but largely local ; that the "blue line" is solely and only caused by calcic depositions ; that the inflamed and spongy gums are resultant from the same cause, and from other irritant matter, such as fermenting particles of food-matter and mucus, and can be successfully prevented or cured by unusual attention to the removal of irritant matter and the establishment of thorough antiseptic conditions.

It would surely be a boon to diseased humanity if it were known that certain strict treatment of the mouth would prevent destruction of its tissues, when, on account of specific poison, it is desirable to continue potent doses of that prince of germ-killers, mercury. We believe this can be accomplished, and that much of the supposed ravages of mercury upon the tissues of the mouth may be safely ascribed to pure carelessness, ignorance, and neglect.

PROCEEDINGS OF DENTAL SOCIETIES.

AMERICAN MEDICAL ASSOCIATION—SECTION OF ORAL AND DENTAL SURGERY.

(Continued from page 832.)

SECOND DAY—*Afternoon Session* (Continued).

DR. E. S. TALBOT read a paper, of which an abstract follows, entitled,—

ARRESTS OF DEVELOPMENT AND DECALCIFICATION OF THE ENAMEL AND DENTINE.

I wish to call your attention to a few observations which I have made in regard to a want of calcification and decalcification of the enamel and dentine. The conclusions arrived at are the result of the study of three cases which have presented themselves to me for treatment.

The first case is that of Miss C., twenty-four years of age. Her jaws have gradually come closer together, owing to a wearing away of the teeth ; the front have exceeded the back ones, so that considerable space was noticed between her front teeth. The articulation was so poor that she was unable to chew her food, and mastication was imperfectly performed with the vault of her mouth and her tongue. Owing to the constant use of her tongue for purposes of mastication, hypertrophy had taken place to such an extent that her speech had become impaired. She was a constant sufferer from indigestion, due to improper mastication, which was readily detected by the thick, white coating on her tongue. Upon examination of her teeth I found them of a dark yellowish color, containing grooves and pits indicating arrest of development, due to some of the eruptive fevers early in life. The bicuspids were the only teeth that had any semblance of normal contour, although the second molars were fairly well developed. None, however, were smooth like ordinary teeth. The roots of the second molars upon the right side of the jaw still remained, while the first molars had been extracted. The anterior teeth, both upper and lower, were worn away from one-third to one-half the height of their crowns. I judge that this was not due to friction by mechanical attrition, for two reasons : First, the present teeth were very rough upon their cutting-surfaces; if it had been due to attrition, they would have been smooth. Secondly, the roots of the second molars were smooth and polished. They did not occlude with the upper molars ; hence abrasion by attrition is wholly out of the question. (Her mother informed me that she cut her first and second teeth early ; the first commenced to erupt three months after birth.)

In order to improve the appearance of the face, and to make the teeth serviceable for mastication, it was necessary to crown all the teeth except the six lower anterior ones. Upon scratching and shaving the crowns and roots, the enamel and dentine could be shaved off like horn or old cheese. The inclination of the crowns and roots of the upper anterior teeth when the jaws were in their proper position was such that the anterior and labial surfaces had to be shaved and ground down to such an extent that the pulp-chamber was ground nearly to the cervical margin, without exposing the pulp, thus showing that the pulp had receded entirely from the crown. This was also the case with the molars. No canals could be found in the roots. A sister of the patient had also had similar teeth ; she died at the age of five, of membranous croup. Her mother said that she had tried to have her children eat oatmeal for the purpose of improving the tooth-structure, thus showing that she was not unmindful of the bad condition of the children's teeth. The father's teeth were in a similar condition, although not quite so bad. The grandfather and grandmother on the father's side were both of a nervous temperament. Tartar accumulated early upon the teeth of all. The teeth of these girls erupted at an earlier age than usual.

Case No. 2 is that of a girl aged eleven years, who was sent to me by her physician for an opinion as to the cause of her trouble, and also for the purpose of treating her mouth and teeth. I found her an exceedingly nervous child : she would cry upon the slightest provocation. Her bones were small in diameter, and she was rather short for her age. Upon examining the mouth, I found the teeth covered with tartar of a bright yellow color. The tartar formed a continuous band extending from the second molar of one side to the second molar of the opposite side ; this was upon both jaws. To such an extent had this accumulation taken place that it was impossible to locate the individual teeth until the tartar was removed. This was very difficult to accomplish, because the slightest grating of the instrument upon the teeth would produce such an effect upon her nervous system that she would nearly go into spasms. I could operate only about five minutes at a time. Upon removal of the tartar I found that the crowns, including the enamel and the dentine, were soft, and cut like horn. The tartar accumulates upon her teeth to such an extent that in two weeks' time they will be completely covered. The child occasionally has nervous spells, at which times all her teeth will ache. She suffered the most excruciating pain for about ten minutes after the impressions were taken for the models which are here presented. No cavities were found in her teeth. The child takes plenty of nourishment, but the phosphates and carbonates are not assimilated, which is also indicated by the small bones and nervous condition.

Believing from the large amount of tartar which is excreted by the salivary glands that an excessive amount must also be excreted by the kidneys, I submitted a quantity of urine to Professor Walter Haines, of Rush Medical College, for an examination. The following is his report :

"From 100 c.c. I obtain 0.0775 grammes of the calcium phosphate (Ca_32, PO_4), from which I calculate that the entire amount of calcium phosphate eliminated by the urine in twenty-four hours is 0.9168 grammes. All the calcium in the urine existed as phosphate, and none as carbonate. Gautier gives the average amount of calcium phosphate in the urine of an adult for twenty-four hours as 0.40 grammes."

When we take into consideration the age of the patient, and the fact that children are not in the habit of excreting the phosphates as grown people are, it will be found that this child is excreting through the kidneys four times as much as a normal individual of thirty years of age. None of the carbonates were present, which shows that a large drainage was taking place from the system.

Case No. 3 is that of a gentleman, a lawyer, forty-two years of age. He complained of sensitiveness of his teeth whenever food was taken into his mouth ; he suffered no pain at other times.

I found that all the teeth were arrested in their development, with pits and grooves running across the anterior teeth and entirely around the bicuspids and first molars, and above and below these grooves constrictions and irregularities of structure occurred, extending to and including the grinding-surfaces. These conditions were the result of arrest of development due to the exanthemata ; he informed me that he had had all the diseases of childhood.

In all these teeth the enamel was imperfect, and the cavities had been constantly excavated and filled. Upon examining these sensitive places in the molars, which were deep, I found that the structure cut like horn or old cheese-rind, and extended into the dentine an eighth of an inch below the soft decay. The color was dark brown. We frequently find these spots of a darker hue in the molars, but still soft when cut with the excavator. No enamel, or rather no hard organized enamel, is present.

Believing from the depth of the cavity and the character of the pain that the pulp was exposed, I cut into the floor of the cavity with an excavator, and finally with the bur, until I was afraid of going through into the alveolar process, without finding the canals. The tooth was afterward filled with cement, and has remained quiet for four months. The secretion of the mouth is alkaline.

Case No. 4 is one which came under the care of Dr. W. C. Barrett, of Buffalo, N. Y., and was presented before the Illinois State Dental Society in 1882.

The following letter accompanied the models : "The casts were made from impressions of the dentition of a young man, a resident of this city, of otherwise full development, in excellent general health, with no marks of inherited disease, and who comes of a strong race, the family occupying high social and business positions. Nearly two years elapsed between the periods of taking the lower and upper impressions, which accounts for an inexact occlusion.

"When I first saw him, the possessor of this denture, the maxillæ, as might be seen in the casts, were well developed, and there was nothing approaching deformity, as the mouth presented a full and natural appearance, although of course no teeth were visible. I counseled him to refrain from any meddling, as his condition could not, in my opinion, be bettered by the dentist. At that age young men are very solicitous about their appearance, and annoyed I suppose at his peculiarity, he applied to another practitioner, who gave a different opinion, removed all the upper roots, and inserted a rubber denture, which the young man is now wearing. I subsequently extracted some of the father's teeth, and have made a microscopical examination of them. It will be seen that there are absolutely no crowns to the teeth, their summits being upon a level with the gum, and this was also the case with the deciduous dentition. The only vestige of enamel was some minute nodules, or kind of bead-work, around the cervical edges of two or three of the molars. The gum had a dense glistening appearance, hard, unyielding, with apparently less than normal vascularity, and seemed admirably adapted to assist in mastication, reminding one of the maxillary appearance presented by the Graminivora, that have incisors upon only one jaw. Of course there was nothing like a pulp-chamber, but the roots of the teeth have nerve-canals, which, however, are obliterated at the cervix. The exposed dentine before extraction of the teeth seemed very dense and hard, and when tried with an excavator was about as sensitive as ordinary enamel. The color of the exposed ends of the teeth was of a rich dark amber hue, approaching mahogany, and they were smooth and polished by attrition.

"This peculiarity is not the result of disease, nor is there anything simulating the appearance of the atrophied crown, which is sometimes the mark of arrested development, due to some functional derangement. It seems the result of hereditary transmission. The father had precisely the same condition, though this son is the only one among several children who has inherited this peculiarity. The father was also the only one in a large family who possessed this dentition. Beyond this I have no certain data; but I am informed that the mark has been persistent in the family as far back as they have any knowledge, although it has seldom appeared in more than one member at a time, some generations escaping entirely, while it cropped out occasionally in a collateral branch without being transmitted to descendants at all. In the direct line of descent it has, as well as I can determine, usually appeared in at least one member of the family, and that without material modifications.

"The young man of whose jaws these casts are fac-similes may, then, reasonably be expected to transmit his denture to one out of a number of possible children, while the others will escape. His brothers and sisters may perhaps have children among whom will be found this lack of development; but the peculiarity will probably end there in their cases, while it is indefinitely continued in the direct line of descent.

"When the father first presented himself to me, he had but two or three of these incomplete teeth left. These were worn down to mere points, and he had for years performed his mastication upon the unprotected gum. The alveolus was so much absorbed that artificial substitutes had become a necessity, and under my directions he was supplied with an entire set. The roots, or the remainder of them, which I removed, were of a dark mahogany color, due to staining of the dentine, and the pulp-canal was entirely obliterated. They had once doubtless been of nearly the normal size, as are those of the son, but had been worn down to the point by mastication, having been gradually raised in their sockets to meet the demands of nature.

"I made microscopical sections of some of the son's teeth, and mounted them for examination. At the cervix of the teeth—the surface presented for mastication—very few marks of the dentinal tubules remained, they seeming to have been obliterated by an infiltration or deposition of calcareous or dentinal matter. As I neared the apex of the roots the sections presented a more perfect dentinal arrangement, and the tubules more of the usual appearance, though the whole structure of the tooth was loose and showed numbers of minute chambers, some of them apparently communicating by what appeared to be abnormally large dentinal tubules. The nerve-canal, entirely obliterated upon the grinding-surface (though from the direction and arrangement of the few tubules visible it had once existed), farther toward the apex of the root made its appearance, and was of nearly normal size. The ends of the roots were well formed, and the apical foramina had the appearance of those in fully developed and well-grown teeth. The cementum was much less in proportion than is usual, the dentine at most being invested with but a very thin layer; but what there was presented no unusual appearance. The enamel, which was found in minute nodules at the cervix of two of the teeth, was extraordinary in appearance. It did not present the usual relation to the dentine, and at the juncture of the two there was not the frequent reaching over of some of the tubules. The enamel-rods had not the usual regular appearance, but the substance of the enamel seemed twisted and contorted. It existed in minute aggregations, and seemed to have little of the usual relations with dentine. Most of the teeth had no enamel whatever. I can do little by way of accounting for this abnormal dentition. The entire absence of enamel in most of the teeth must have been due to a lack of enamel organ, or to its functional inactivity.

"The teeth erupted about the usual period, though perhaps a little later than usual. They have never shown any signs of caries, those of the father wearing out without decay, and those of the son being perfectly sound and quite exempt from disease. The case has been one of interest to me, and I should be glad to know if any other dentist has met with a like peculiarity."

Such conditions are frequently observed in connection with one or two, or even three or four, teeth. I can recall a number of cases where the lower central and the lateral incisors of both sets are in the same condition, while all the other teeth are normal. I have frequently seen, and you have all observed, the first permanent molars in that soft condition contracted at different points, presenting holes and grooves which run in all directions. The decay extends deeply, and is of a dark brown color, resembling spunk, or the decay at the heart of a tree. The tooth is exceedingly sensitive to touch, and painful when food of different qualities comes in contact with it. The excretions of the mouth are usually perverted, and when these teeth are excavated the softness of the enamel and dentine is readily noticed. The pulp recedes, frequently obliterating the pulp-chamber.

The roots of the case illustrated by Dr. Barrett seem to be covered at the cervical margin with dentine, which would indicate that the pulp had also receded. I have observed this in the roots of molars, bicuspids, and incisors when in a similar condition.

When this condition takes place in old people the enamel and dentine become exceedingly hard, and no sensation is experienced when the tooth is excavated. You will therefore observe that while the recession of the pulp is precisely the same in both cases, the results are directly opposite.

We frequently find that the first permanent molar, and sometimes the second and third, are worn away, and all the other teeth are normal. These mouths sometimes present strange conditions. First, decay is rarely present. Dr. Barrett very aptly says in his case, "that the teeth showed no signs of decay, those of the father wearing out without decay." The secretion of the mouth is almost always alkaline, and quantities of tartar are usually present. In ordinary mouths, when the secretions are acid, decay would take place because of the recession of the pulps: usually tartar in large quantities is present. These conditions render decay almost impossible. These teeth are always soft, cut readily under the bur, and the pulps recede, so that in many cases the pulp-chamber is entirely filled. The anterior teeth upon the upper and lower jaws will wear away, frequently leaving a space of from one-fourth to three-fourths of an inch between them, while the teeth posterior to them occlude. The enamel, although nearly twice as dense as the dentine, wears away as readily as the dentine.

We have already shown that in some cases the phosphates and carbonates are not assimilated. This, to my mind, is the cause of erosion and abrasion. We instinctively make the remark to a patient that it is better for teeth to erupt late, because the tooth-structure will be of a better quality. When they erupt early, the structure of the tooth is not well nourished. This condition can also occur in utero, the mother not giving sufficient nourishment to her child.

Dr. Marshall, in his paper, "The Oral Cavity of Pregnant Women," read at Newport in 1889, alludes to "certain cases of pregnancy in which the nutrition was impaired, and as a result the bones and dentine become abnormally soft, and that thus this softening of the dentine predisposes the teeth to decay." The child after birth may be poorly nourished, and then the bones, teeth, as well as other tissues of the body, suffer as a result. You are all familiar with the fact that the teeth suffer from a want of nourishment, and arrest of development will take place when the child is afflicted with constitutional disease.

After the teeth are formed they frequently decalcify. This is well illustrated in the case of pregnant women: the teeth seem to lose their vitality, and decay early. If the teeth disintegrate under these conditions, why will they not in constitutional diseases, as consumption, typhoid fever, etc.? We know that this is the case so far as decay is concerned. I have called your attention to the fact that in some cases, especially in children between twelve and twenty, the phosphates and carbonates do not assimilate, and hence there is a softening of the teeth and bones. We find that these substances which are taken in the system in the form of food for the nourishment of the body are deposited, unorganized, upon the teeth, being excreted by the salivary glands. These substances are also excreted by the kidneys. The brain is not properly nourished, and as a result the child becomes very nervous; or, again, the child may possess a very active brain, and the phosphates are entirely used up in its nourishment, the bones and teeth suffering in consequence.

I have tried to find some mode of treatment, but at the present time have been unable to lay down any fixed rule. Plenty of outdoor exercise and good nutritious food are about all the measures that can be suggested. It is possible if the child lives long enough that he may outgrow this want of assimilation.

Adjourned till 10 o'clock A.M. the following day.

THIRD DAY—*Morning Session.*

The section was called to order at 10 A.M., Dr. J. Taft in the chair.

The discussion of Dr. Talbot's paper was declared to be the order.

Dr. W. C. Barrett. We should try to determine the reason of the want of enamel in these cases. In one case there was a total lack of crowns to the teeth, and no enamel at all, except some little nodules at the gingival portion. In my report, quoted by Dr. Talbot, I stated that the dentinal tubules were not entirely normal. I believe this was because there were no crowns to protect them, and being normal at first, the modifications were caused by the want of the protection of the enamel. The roots were perfect, and mastication was performed upon the tops of the roots. Of course there was a cause for this absence of enamel. Could it be an entire failure of the enamel-membrane derived from the epiblast while the mesoblast performed its office correctly? The deciduous teeth of these patients had some kind of crowns. I do not know and could not learn just how near to normal they were.

We should take up and make a study of the pits and cracks often found in enamel. No one has as yet demonstrated the reason for them. They have been ascribed to the diseases of childhood, but if this is true why do they not occur all over the enamel? The enamel is all formed at one time, and these pits and marks should be in all parts of it. We all know that this is not generally the case, and we cannot prove that they are connected with the eruptive diseases of childhood. If every child who had eruptive diseases had these defects in its teeth, then it might prove that they were the cause, but it is not so.

Dr. Gish reported a case of a child, seven years old, whose temporary teeth were in a condition very much resembling the teeth described by Drs. Talbot and Barrett, only that they had had crowns. When he first saw the case, every one of the deciduous teeth was worn off even with the gums, and the roots were of a polished mahogany-brown appearance. He watched the case with a great deal of interest. He had to remove the roots of the premolars, as they were so firm that the permanent teeth could not erupt. When the permanent teeth did come in, they were quite perfect. What factor could cause such a condition in the deciduous teeth which still would not affect the permanent set?

Dr. Fletcher asked Dr. Barrett how many generations of the family—the subject of his report—he had positive knowledge of.

Dr. Barrett said he had positive knowledge only of the father and son. As for the preceding generations, he knew nothing only that it was an accepted tradition in the family that there had for a long time been one or more with short teeth in each generation.

Dr. Allport spoke of three girls in one family, who were patients of his, whose teeth were quite short and of a light slate color; in two of the girls the back teeth only were affected, in the third even the front teeth were of the same color. He learned that the grandfather had teeth of the same character, though the boys in the same family had perfectly natural and well-formed teeth. The peculiarity was evidently hereditary.

Dr. Talbot said, in closing the discussion, he wished to call the attention of the section to the prevalency of cases of a want of assimilation of the phosphates and carbonates in the food, and the consequent lack of these elements in the teeth, bone, and brain. We will find a child, say of twelve or fourteen years,—likely a girl,—very nervous; eats everything, beefsteak, milk, etc., yet is so nervous that she cannot control herself,—perhaps cannot hold her urine. She will be a bright child, with small bones. Upon examination her teeth will be found full of tartar, and her urine loaded with carbonates and phosphates. This material, so badly needed to supply the bones, teeth, and nervous system, is not assimilated, but is excreted by the salivary glands and in the urine.

Similar conditions are found in pregnancy : the teeth decay more rapidly than they would otherwise, and if a limb is broken the bones cannot be gotten to unite. These cases show that the phosphates and carbonates are appropriated by the fœtus. We know, too, that in many diseases the teeth do not receive sufficient nourishment. The teeth show erosions arising from the constitutional condition which produces softening, and the attrition of the food and the adjacent parts wears the teeth away. Dr. Truman says that in erosion the structure of the teeth is harder than usual, but I think it is softer.

We all have these patients, but none of us know how to treat the condition successfully. We are advised to take the child from school, keep her out of doors, on a farm, with horseback or bicycle riding. We will try all these and many other measures, but with little prospects of success. The probability is that such a child will die of consumption within a few years.

Another condition of the system which affects the teeth is gout. A gouty patient will almost, if not quite invariably, show a softening and erosion of the teeth.

Dr. Fletcher said he had a case, a patient about forty-five or fifty years old, whose incisors were entirely denuded of enamel on the labial side. The appearance was not as if it had dissolved away, but rather as if it had split off, as the edges were distinct.

Dr. Clifford asked if there was any peculiar diathesis in this case.

Dr. Fletcher said he did not know of any.

Dr. Barrett reported a case somewhat similar, with the enamel all gone from the labial surface, leaving it smooth. The teeth came to a sharp edge and crumbled away. He did not know what to do with them, unless he put crowns on them. The enamel on the lingual surface was intact. They were just the reverse of the teeth of rodentia.

On motion, the subject was passed, and Dr. J. L. Gish read a paper on "The Diseases of the Gums."

Dr. Gish's paper included a classification of the various pathological disturbances of nutrition as they are expressed in the soft tissues of the mouth. He described clearly and fully the several types of inflammation, from simple acute to chronic suppurative inflammation, as well as the cellular changes expressed as morbid growths. The pathological processes, as well as the clinical appearances in their different phases, were fully set forth, and the paper was a fair *résumé* of present knowledge in this department of pathology.

Its great length, and our lack of available space, coupled with the fact that we have recently presented our readers with similar matter somewhat *in extenso*, precludes a fuller abstract.

Dr. Fletcher related an experiment which he had made to show the influence of the faradic current in the circulation. He isolated the mesentery of a frog, and under the microscope watched the circulation until stasis had set in in a few of the vessels ; then, by turning on the faradic current, he cleared up the whole zone. The shock stirred up the white blood-corpuscles and started up the circulation. He had found the use of the current in diseases of the gums very satisfactory, as described in the paper.

Dr. Curtis said the essayist had ably described the pathological conditions of diseased gums, and he regretted that the treatment had not been described more fully. He believed electricity was a great remedy for these diseases, and as we get to understand the use of it better, we will be better able to treat them.

Dr. Marshall said, in regard to the use of the electrical current, if the positive pole is placed over a location where hyperæmia exists, and the negative pole over the base of the brain, the hyperæmia will be decreased. If the poles are reversed, the hyperæmia will be increased. His treatment had been mostly in cases of hyperæmia of the pulp. When the tooth does not positively pain the patient, but feels as if toothache were imminent, by applying the current and repeating for a day or two the condition will be passed, and the necessity for further treatment averted.

Subject passed.

Dr. G. L. Curtis read a paper entitled, "Remarkable Sequence of Operation for Necrosis at Base of Skull: A New Method of Resecting the Third Branch of the Fifth Nerve," which is printed in full on page 900 of the current number.

There was no discussion of the paper, the members present generally agreeing that the subject was out of the domain of ordinary dental practice, and the operation one which few of them would care to undertake.

Dr. W. C. Barrett read a paper on

THE CONDITION OF THE DENTINE IN PULPLESS TEETH,

of which we present an abstract, as follows:

Dr. Barrett stated that when he had promised to read a paper upon the above subject, though he had bestowed some thought upon it and had made himself tolerably familiar with its literature, he was not aware of the extent to which the ground had been covered by Professor W. D. Miller, in his work on "Micro-Organisms of the Human Mouth," and his contributions to the various journals, notably the DENTAL COSMOS. His failure to realize the importance of Professor Miller's work in its bearing on the subject of his paper was no doubt due to the fact that he was not making an especial study of the subject during the time of his reading of Professor Miller's publications. He wished to emphasize the thoroughness of Professor Miller's investigations, and to call attention to the importance of his deductions. He felt that he could do no better in redeeming his promise to read a paper on the condition of the dentine in pulpless teeth than to present a general *résumé* of Professor Miller's conclusions on the subject, collated from his writings; for, in view of the overwhelming original testimony which he introduces, no man has the right to dispute his deductions until he is fortified by a like mass of opposing facts, deduced from like carefully conducted experiments, or until he can indisputably demonstrate that the conclusions which have been reached by Dr. Miller are not warranted by the results obtained.

The dentine, deriving its nutriment from the pulp of the tooth through the dentinal fibrillæ, is separated from all the other tissues of the body through investment by the cementum and the enamel. The latter tissue is not only devoid of living matter, but it is not in direct relation with any tissues save the dentine itself. For our present purposes the enamel may be looked upon as a simple protecting cap, whose office it is to preserve the dentine and pulp from injury.

The cementum is of a different character. It is but slightly differentiated from true bone. It is in relation with a periosteal membrane, and it is nourished like bone through a system of lacunal corpuscles, connected by canaliculi.

In young teeth it is not infrequently the case that there is even a kind of Haversian canal traversing the cementum and dentine between the pericementum and pulp, whose office it is to assist in maintaining the vascular supply, and incidentally, perhaps, to afford nutriment to the deeper cementum corpuscles.

The dentine is yet more differentiated, and in its structure has lost the lacunal corpuscles, while the canaliculi are modified into the dentinal fibrillæ. Their office is not materially changed, nor are we to suppose that the contents of the dentinal tubuli differ very widely from the canaliculi of true bone. They form the living portion of the dentine, as the lacunal corpuscles and the canaliculi form that of true bone. The dentinal fibrillæ are in connection with the vascular pulp, and from it derive the nutriment necessary to their continued life. The corpuscles found in true bone and in cementum are absent, and hence there is little that bears a resemblance to that concentric texture of true bone which forms its lamellated structure. At the extremities of the dentinal fibrillæ we have the irregular inter-tissual spaces which mark the boundary line between dentine and cementum, and which may perhaps be considered as modifications of the cementum corpuscles, but they are not intimately connected with the dentinal structures.

The dentinal fibrillæ, depending as they do upon the vascular pulp for nutrition, certainly lose their protoplasmic vitality when separated from it. Let us consider for a moment the condition of the dentine in a tooth, the pulp of which has, without medication, just been removed. The fibrillæ have been freshly torn from their relations with the pulp, and remain filling the dentinal tubuli as before their violent separation. Like all protoplasmic material, they are composed of the great quaternary of elements which enter into the composition of all organic elementary structures. But the dentinal fibrillæ also contain probably other elements, such as sulphur and phosphorus, which make it more near the nature of albumen. Indeed, it is probable that if we consider it as clearly albuminous, we shall not do much violence to nature. Carpenter says that this substance is the proper pabulum of the animal tissues generally, and so the dentinal fibrillæ, possibly modified somewhat, may be looked upon as albuminous in their nature.

The dentinal tubules which contain the fibrillæ are exceedingly minute. For the putrefaction of the contents of the tubuli it would be essential that putrefactive organisms should enter them. While it is quite possible that these may penetrate the tubuli, it must be to but a limited extent. In the article in the DENTAL COSMOS for May, 1890, upon "The Decomposition of the Contents of the Dentinal Tubuli," Dr. Miller shows that from their minute size and the very small amount of nutriment for the micro-organisms which they contain, any bacteria which enter them must soon perish from want of pabulum, to say nothing of the fact that they are mostly aërobic, and so could not possibly live in the tubuli for any length of time.

But not satisfied with *a priori* reasoning, he commences a rather remarkable series of experiments and observations, from which he incontestably deduces the conclusion that bacteria do not penetrate the tubuli of undecayed dentine to any marked extent,—certainly not enough to cause any necessity for the disinfection of the dentinal substance, in teeth in which there has been no decay within the pulp-canals. There was no necessity for enlarging upon this. The record is open to the inspection of all, and no one has yet dared to take issue with Dr. Miller upon this point. It must be accepted that in the dentine of the roots of teeth in which decay has made no progress there is no infection of dentine that demands any antiseptic treatment, aside from that usual in pulp-canals.

What, then, becomes of the contents of the dentinal tubuli? It is but necessary to consider their character to form a clear estimate of this. The dentinal fibers cannot be considered as pure albumen, for that is only found in connection with other substances in the body. But whatever its exact composition, it presents certain characteristics, one of which is its tendency, when at rest and separated from living tissue, to dissociate the watery portion, and to form a dried residuum which is insoluble. This condition may also be produced by most acids, by the metallic salts, and by creasote.

The natural tendency, then, for an albuminoid fibril would be to assume a mummified condition, most conducive to its indefinite preservation when kept in the state in which it will be found in the dentine of a tooth-root.

Fibrin is but comparatively slightly differentiated from albumen. It contains the same elements, but it offers certain physical characteristics that distinguish it. Albumen is coagulated by heat and by certain agents. Fibrin coagulates spontaneously when exposed to the air. If, then, the fibrillæ of the dentine approach fibrin in their characteristics, they will undergo the change called coagulation without the intervention of any medicinal agent whatever. It is in this condition that, if sealed up from external influences, they present the very best state for the preservation of the tissue in which they are found. Hence the condition of the dentine is best in which the contents of the tubuli have been coagulated, or separated from the watery elements, and permitted to become a kind of minute mummy within their investing sheaths.

But the investigations of Miller, already referred to, determine another matter. He did not find that the mouths of the dentinal tubuli in teeth from which the pulp had been removed were opened toward the pulp-chamber. He had under examination nineteen teeth. In ten of the roots of them he found the canals to be completely or partially lined with a homogeneous structure, containing few or no tubuli, but occasionally a formation resembling a bone-lacuna, and bearing a much more near resemblance to cementum than to dentine. This layer is impenetrable to micro-organisms, and therefore forms a protection to that tissue when the pulp has been removed. We find, then, that the dentine is not only protected by the cementum on its external aspect, but very often by a modification of this tissue on its inner surface.

There is, therefore, little danger of infection of the contents of the dentinal tubuli. But, even if this were possible, he did not conceive that it would matter much. The amount of infectious matter would be so small, and the chance for the penetration of the gaseous products of decomposition through the dentinal tubuli past the zone of demarcation between dentine and cementum, and finally through the cementum corpuscles and canaliculi, which are themselves filled with living matter, would be so remote and its influence upon the pericementum so infinitesimally small, that it seems folly to take it into consideration in the presence of so much more potent factors.

Clinical experience, too, as is so plainly stated by Dr. Miller in the article to which reference has been made, does not sustain the theories of those who insist upon the possibility of infection from dentine. If the contents of the pulp-canal be completely removed, the territory made thoroughly aseptic, and the space finally filled, there is, so far as he was aware, no record of any trouble from the dentine. Even admitting that there exists within the dentinal tubuli matter which is susceptible to putrefactive changes, it is too small in amount to induce any disturbing conditions in the presence of a pulp-canal carefully filled with a material which must seal the exceedingly minute mouths of the tubules wherever they are not already stopped by the modified dentinal layer of which Miller speaks. In the presence of much more important things, it seems like bad judgment to elevate such a mole-hill into a mountain, for it has a tendency to carelessness in things that need more attention. He doubted whether there had ever been a case of re-infection of the tissues about a tooth that has had its root filled after antiseptic treatment, that cannot be directly traced to some imperfection in the manipulation, or to some infected pockets outside the tooth itself. It is well known that the usual place for the formation of an infected pocket is at or near the apex, and that there may be a penetration of the micro-organisms and the formation of infected pockets for some distance back in the bone. He himself had seen at least three such, extending back from the point of an incisor tooth until the last one was over the second bicuspid, and each of these separate pockets connected with the original one at the apex of the incisor. They were only reached by a long incision through the gum and external alveolus, extending from one to the other until the last one had been reached. If the infection had been from the dentine, it would have manifested itself quite differently.

Undoubtedly there are cases in which the infected spot is at some point in the pericementum between the gingival margin and the apex of the root. But this does not by any means prove that it came from infected dentine. Perhaps after the apical foramen, the most usual place for the formation of an abscess is at the bifurcation of the roots of a bicuspid or molar. He believed this to be due to the fact mentioned earlier in this paper: that something analogous to a Haversian canal there may penetrate the cementum and dentine, from the pericementum to the pulp. He had demonstrated such many times. Not infrequently an abscess refuses to yield to the usual treatment through the pulp-canal, and for the reason that the medicaments fail to reach the infected point. But such instances cannot be said to be produced by infected dentine.

There is, in truth, another foramen analogous to that at the apex, and it becomes septic in precisely the same manner as does the latter.

In what had been previously urged, he had presupposed that caries has not commenced within the pulp-canal; and yet we are all well aware that in cases in which the pulp had been long dead, and there has been extensive decay of the coronal portion of the tooth, there was caries of the dentine commencing within the pulp-chamber and extending down the canal.

In instances like this, of course, there will be thorough infection of the dentine. It will not, however, be due to decomposition of the contents of the dentinal tubuli, but to infectious matter which may find its way into the hollow from external sources. It would be as manifestly improper to fill such a canal without removing the carious portion, as it would be to fill a cavity from the outside without careful excavation.

Here will be an instance in which the reaming out of the canal to the depth to which caries had penetrated would be eminently proper practice. It is very seldom that this decay will extend far down the root-canal, or be very deep, without such destruction of the crown and cervical portions of the root as to make preservation practically impossible.

As regards the use of coagulating agents in the treatment of root-canals, he could not conceive of any objection to them. If by any it be thought necessary that dentine should be disinfected and made more aseptic, this can only be accomplished by agents which have the power of penetration in a marked degree. These are usually coagulants, like chloride of zinc, bichloride of mercury, etc. Upon this subject he referred to the experiments and observations reported by Dr. Miller in an article on "The Relative Rapidity with which Various Antiseptics penetrate Pulp-Tissue," published in the DENTAL COSMOS for May, 1891.

Discussion.

Dr. E. L. Clifford said the discoloration found in dead teeth was probably caused by the formation of sulphides of some of the different metallic agents used in medicaments. The less we treat the teeth in the vast majority of cases, the better will be the results. No law can be laid down to which exceptions could not be found, but in the majority of cases the quicker we fill a root-canal and the cavity over it, the more satisfactory the operation will be. Two things, however, work against immediate root-filling: first, the difficulty of drying the root; and second, soreness of the tissues about the root. If there is no way to dry it thoroughly, or if it is too sore to work on, then it is better to wait. In all favorable cases he advocated immediate filling.

Dr. W. W. Allport said the section was under obligation to Dr. Barrett for a most excellent paper.

In our practice we have two classes of pulpless teeth to treat. Those we devitalize leaving the dentinal fibers in the condition when devitalization took place, are in the most favorable condition for successful treatment. The other class is where the nerve has been dead for a long time. Here the condition is different, and the treatment must be adapted to the altered condition.

Our aim should be to prevent discoloration of the dentine. Whether this can best be done by the use of oils or of chlorine, or by thoroughly drying the cavity and canal, so as to leave the fibers in a mummified condition that will prevent decomposition, is the question to decide. In old cases we should use every means in our power to restore the normal color, but in freshly devitalized teeth little or no treatment is necessary.

Dr. Gish said that whatever treatment was necessary could as well be done in one sitting as in twenty, and that the duty of the dentist to his patient calls for the course of treatment necessitating the least trouble and pain, therefore he advocated immediate filling.

Dr. M. H. Fletcher said that to him it seemed that the pulp-canal before filling must be surgically clean ; that is, it should have all substances removed which might contain or support any spores or bacteria. In a case reported by Dr. H. A. Smith in a paper read before the Mississippi Valley Dental Society, trouble arose at the apex of a tooth that had been filled for fourteen or fifteen years. In the discussion it was said that there had been a continual effort at the apex of the root to dissolve the root as a foreign material. This will always happen if there should be an excess of filling-material forced through the end of the root, and if the tubuli had not been thoroughly disinfected the septic matter contained in them would set up suppuration.

In regard to the substance covering the tubules from the pulp-chamber, he had learned that after the tooth is fully formed there is a deposit, as it has been called, a translucent zone, lining the chamber and pulp-canal, but the deposit as he had seen it is penetrated by the tubuli. This must be so or the deposit could not take place, and he thought the tubuli were sufficiently numerous to need disinfection.

Dr. G. L. Curtis said the paper was an argument in favor of removing the pulp while it was healthy, and not destroying it by any substance that would enter the tubules. He could understand how in teeth so treated the deposit spoken of would occur, but in teeth dead for a long time it would not be there.

Dr. A. E. Baldwin did not agree with Dr. Barrett's idea that anything was so well proven that a dentist should finally accept it as a truth without satisfying himself by independent investigation. Because another had formed a theory and by experiment satisfied himself of the truth of it, was no reason anyone else should accept it. In regard to bacteria and microbes, and the necessity of making our root-canals aseptic, he disagreed with the paper. He did not think we could get them in better condition than by desiccation. He seldom uses anything in the way of antiseptics except carbolic acid in five per cent. solution, and has very good success. If he can get the root cleaned out, in an ordinary sense, whether it is "surgically clean" or not, and get it thoroughly dry, he did not worry about the success of the filling. He thought a great deal of the irritation about the end of the root can be treated from the outside rather than through the root-canal.

Dr. Barrett said we would have to modify our view in regard to the pathology of alveolar abscess. He believed it to be thoroughly demonstrated that the pericementum furnishes all blood-supply to the growing tooth. He did not believe anybody ever saw arteries and veins passing through the apical foramen. He believed there is something like Haversian canals that pass through the dentine and the cementum to the pericementum, and that pus will often be found about diseased teeth at the bifurcation of the roots, and this shows why the treatment through the roots will not succeed. He believed that thorough drying will make a tooth aseptic, but sometimes the point of infection will be found away off from the tooth that seems to be the cause of suffering to the patient. In these cases, of course, the treatment must be on the outside, and followed up till the point of infection is discovered and broken up and cleaned out.

Subject passed, and the section adjourned to meet at 2.30 P.M.

(To be continued.)

AMERICAN DENTAL ASSOCIATION.

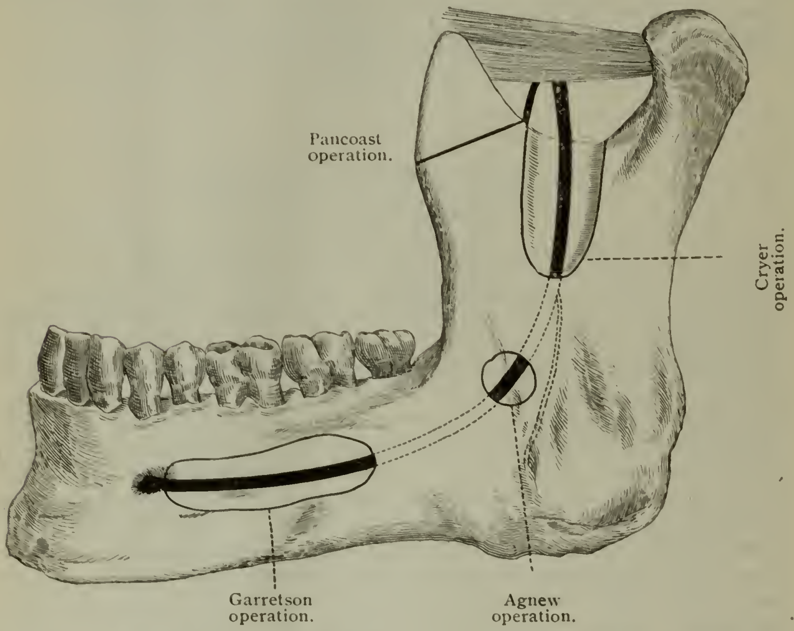
(Continued from page 848.)

FIRST DAY—*Evening Session*—(Continued).

DR. M. H. CRYER, Philadelphia, reported a new operation for the resection of the inferior dental nerve. After describing briefly the anatomy of the lower jaw, he referred to various ways in which the inferior dental nerve has been operated upon for the relief of neuralgia. In one devised by Dr. Garretson, an incision is made in the soft tissue along the lower border of the body of the inferior maxillary bone, the tissues elevated so as to raise the opening upon the bone in a line over the inferior dental nerve, then, holding the lips of the wound apart by retractors, the bone covering the canal is removed by a circular saw and bur driven by the engine. In this way the entire canal within the body of the bone can be exposed and the nerve removed, the soft parts being allowed to assume their normal position and closed. The small scar from such an operation is almost unobservable. Another operation, devised by Dr. Agnew, is to make a trap-like opening over the lower half of the ramus, then remove a portion of bone by the use of a trephine, thus uncovering the canal, when a portion of the nerve can be taken out. These operations often fail to cure, and it is claimed by several surgeons that the mylo-hyoid nerve may be involved, thus accounting for the failure.

Dr. Joseph Pancoast's operation was to remove the coronoid process. The objection to this is that it causes the loss of the use of the temporal muscle. It is also difficult by this operation to reach the nerve, on account of the awkward position and the adipose tissue in the way. The difficulty in taking the nerve up from this point suggested to the speaker, some two years ago, that instead of cutting away the coronoid process the sigmoid notch could be deepened down to the inferior dental foramen.

In making the trap-like opening, avoid cutting the duct of Steno. After the opening is made, exposing the bone, take a large spear-pointed drill, with the dento-surgical engine, and perforate the part of the bone to be removed; then with a barrel-shaped surgical bur with a smooth or safe end remove the bone down to the foramen. In working with the surgical engine, either with saw or bur, it is well to have a large bottle filled with antiseptic fluid suspended above the operating table, allowing the fluid, by the aid of a small tube, to flow over the parts while operating, preventing the bur from clogging and keeping the parts free, so that the operator can see just what he is doing. After removing the bone, the nerve, artery, and vein can readily be lifted up by the use of a tenaculum. The nerve must then be separated, and taken hold of by hemostatic forceps above the point at which the mylo-hyoid nerve is given off; draw as much of the nerve out of the canal as will come, and cut the mylo-hyoid nerve as near to its distribution as possible; still holding the nerve in the forceps, dissect it out from the tissue and cut it off near the oval foramen. It is much better to cut the nerve than to break it.



Dr. J. J. R. Patrick, Belleville, Ill., wanted to know who advocated the removal of the coronoid process to get at the inferior dental nerve.

Dr. Cryer. Dr. Joseph Pancoast.

Dr. Patrick. That would destroy the temporal muscles.

Dr. Cryer replied that he had said so.

Dr. Patrick. Would not the zygomatic arch interfere with this proposed operation?

Dr. Cryer. It did not interfere. In reply to another question as to whether the operation cured neuralgia, Dr. Cryer said that the operation of deepening the sigmoid notch had been performed twice, the first time in March, 1891, and the second in March, 1892. Both patients have remained well, except that the first sometimes feels a little twinge; but this is possibly from another nerve.

Dr. A. E. Hoadley, Chicago, Ill., had listened to the so-called new operation with considerable interest. It presents new points, inasmuch as it contemplates extending the sigmoid notch; otherwise there is nothing in it that is new. Very often, when the old operation of trephining was performed, a portion of the bridge of bone over the nerve was clipped out and then replaced. Pulling out the inferior nerve and cutting it off would destroy all function. Certainly there could be no further neuralgia of peripheral origin after that; the peripheral function would be destroyed irreparably. If the neuralgia continued after section of the nerve, that would be proof positive that the seat of irritation was higher up. One other point: The coronoid process rises very slightly above the zygomatic arch. It can be cut off below the arch, the nerve resected, and the bone united with first-class prospects of union. If there is good apposition there is union. In all plastic operations on the face and lower jaw and in fractures there is usually good union. The bone unites readily under most circumstances. This operation to which he had referred is extremely simple, and is not attended with any danger. The nerve is cut off a little higher up, in the operation described by Dr. Cryer, but not sufficiently to make any difference in the curative effect.

Dr. W. N. Morrison, St. Louis, Mo., was surprised to see the subject brought up in this form in operating from the external surface. When the method of resecting the inferior dental nerve by using a dental drill was first reported, it was shown that there was no wound on the external surface of more than a quarter-inch in length. He could not understand why the dental operation was not more used in the medical profession. It was given to the public about 1875, and the speaker had furnished the first dental drill for the operation. Now it seems that we are going back to the old way of disfiguring the face without accomplishing anything that cannot be as well done without that complication.

Dr. Thomas Fillebrown, Portland, Me., could "go even that operation one better." The operation can be performed without any wound upon the external surface, because you need not work from that surface. It is a fact that not many cases are cured by this procedure of resection, and it is not worth while to disfigure the face so much for the merely temporary relief; but if resection is decided upon, it can be accomplished entirely within the mouth by passing from the site of the inferior bicuspid to where the nerve enters the inside of the jaw. One case in which this operation was performed was well for a year and a half, at the end of which time the patient came back and another operation was performed, in which all of the nerve was taken out to the soft tissue. Afterward the neuralgia returned, and a still further operation had to be done. The second relieved the patient for six months, and the last not at all. The trouble in this instance is centric, and operation is not of much use in that class of cases. Another case in his experience was cured, but it was cured by our good friend death. The patient died in two years.

Dr. T. W. Brophy, Chicago, had never so far had occasion to make an external incision for the removal of the inferior dental nerve. Dr. Cryer's operation is a new one, but it is external, which plan of procedure can be and should be avoided. If in performing the operation the nerve is drawn down and cut and the canal cleansed antiseptically, the nerve will not be re-formed. The old way of performing the operation by seizing the nerve with the tenaculum had the element of danger from hemorrhage. In a case of this kind he should first operate through the mouth ; then, if necessary, externally as a last resort.

Dr. Cryer had no idea of provoking a discussion when he described the method. He hoped it would be recognized that the gentlemen with whom he was associated would not think of making an external incision until the minor operations had been tried. All of us know that the nerve-tissue when cut will, under certain circumstances, unite. Of this he had seen many instances. In his own body two inches of nerve-tissue had been reproduced, so that he believes that where neuralgias return after operation it can be attributed to this cause. Dr. Morrison speaks of disfiguring the face by making the opening spoken of. In olden times such might have been the case. To-day it is so performed that within two or three weeks the scar is almost unobservable. Dr. Filiebrown speaks of resection of this nerve where it enters the inside of the jaw by operating through the mouth. This is a very difficult operation, and a good many factors are to be thought of in connection with it. Having to work through the mouth, it is difficult to keep the patient under the anesthetic,—the parts are very vascular, the blood and saliva soon cover them, the patient gags, etc. Only a very short piece of the nerve can be taken out, and this will account for the re-occurrence of pain as spoken of by the doctor. The main point in all resections of this kind is to remove as long a piece of nerve and as near to the base of the skull as possible, and then, if such operations fail, to remove the Gasserian ganglion. Another serious objection to the operation spoken of by the doctor is that you are in the neighborhood of important vessels, and should they be cut it is very difficult, almost impossible, to ligate them. In one case in which he assisted in this mouth operation they had a hard time to save the patient's life. His only object in describing the operation which had called forth the discussion was to draw attention to the fact that by deepening the sigmoid notch you open immediately over the nerve where you are free from every tissue, and he wished to claim here the importance of that freedom.

Dr. A. H. Thompson read his paper entitled "The Grinding-Teeth of the Herbivorous Mammalia."*

The association adjourned till to-morrow morning.

SECOND DAY—*Morning Session.*

The association was called to order pursuant to adjournment, President Walker in the chair.

On account of the secretary, Dr. Cushing, being ill, Dr. A. W. Harlan, of Chicago, was made secretary *pro tem.*

Dr. W. C. Barrett, of Buffalo, read a paper entitled "A Brief Study of the Molar Teeth of the Proboscidiæ."†

Dr. James Truman, Philadelphia, did not propose to discuss the paper, which contained many new points,—at least they were new to him. One that especially interested him was the statement as to the three anterior molars of the elephant not being deciduous. Some authorities class these teeth as deciduous, though the question as to which dentition they belong to is not absolutely decided. He would like Dr. Barrett to state on what grounds he considers them permanent teeth.

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* Printed in full in the DENTAL COSMOS for October, page 792.

† This paper will be found at page 873, current issue DENTAL COSMOS.

Dr. A. H. Thompson, Topeka, Kan. Although the paper is somewhat elementary, there is very little in it to take exception to. The incisors of the elephant are not analogous to those of the rodents. There is a functional difference between them, because they are used for different purposes. The incisors of the elephant, or tusks as they are called, are for use in uprooting trees and for weapons of warfare. The incisors of the rodents are for cutting food, and although they have persistent pulps, their length is kept down by the use to which they are put. With regard to the abnormality in the jaw of "Jumbo," he thought it was due entirely to lack of wear, which has a certain relation to the successor of the tooth. The tooth which preceded this one was not disposed of in time, and the proper development of the other was thus interfered with. He thinks Dr. Barrett is wrong in his statement with regard to there being excessive wear on the teeth of these animals in captivity. On the contrary, the speaker thought that there was a lack of wear under such circumstances, because of the restricted foods upon which the animals feed in captivity.

Dr. C. N. Peirce, Philadelphia. Both of the papers which have been read under this section have afforded food for thought. A matter of considerable importance in studying the teeth of these animals is that the arrangement of the plates indicates the excursion of the jaw. Wherever the plates are disposed at right angles to the body of the tooth, there is an antero-posterior motion of the jaw. Where we have a modification of this position, with the plates at other angles, the jaw has a rotary motion. The idea is that the motion of the jaw in mastication is always according to the arrangement of the plates in the teeth. With regard to the abnormality in "Jumbo's" jaw, he was quite inclined to agree with Dr. Thompson that it occurred because the predecessor of the tooth which was irregular had not been thrown off in time. One fact that sustains that conclusion is that the posterior portion of the tooth is not formed at the same time as the anterior, so that this continued persistence in the jaw would have some such effect as that seen in the specimen. A point of interest in this connection would be to know whether in consequence of this irregularity of his tooth "Jumbo" had any rotary motion of the jaw. The excursion of the jaw in the capybara indicates that it has the same arrangement of plates as the elephant and the same motion of the jaw, showing similar habits in the two animals.

Dr. Truman would like to call attention to the change from the tooth of the mastodon to that of the elephant, indicated by the specimens exhibited. The former shows enamel-covered tubercles, and the latter successive layers of enamel and dentine, a difference which was unquestionably caused by the progressive character of the foods upon which the animals subsisted.

Dr. Barrett. The question has been raised whether these smaller molars of the elephant may not be deciduous teeth. A deciduous tooth, as he understands it, is one which is thrown off and succeeded by another of somewhat different character. There is no such succession in the elephant, nor is there a vertical succession. The structure of the teeth also is identical. He therefore could not consider the earlier ones deciduous. If we consider the first, or the second, or the third as deciduous, then the animal has no permanent dentition, because from the similar character of the teeth they must be all permanent or all deciduous. Dr. Thompson says the incisors of the elephants—the tusks—are not of the same character as the incisors of the rodents, because they have not the same office. In the speaker's view, the office has nothing to do with it. They are all teeth having persistent pulps, and all will continue to develop until they reach the final limit of size. For this reason they are similar. As to the wear of the teeth of "Jumbo" or of elephants generally kept in captivity, he fully comprehended the weight of the reasons which have been advanced to account for greater wear in a state of freedom, but he must do his own thinking. In the native state the food of the elephant is the succulent grasses, twigs of trees, green boughs, etc., in the mastication of which there is much less wear than when the animal is fed on dried hay and grains. He therefore must insist that the wear of mastication is greater in captivity among these animals than in their wild state. One gentleman has called attention to the fact that the anterior plates of the molars are developed first. That sustains the speaker's position. He could not say if "Jumbo" had an abnormal excursion of the jaw, but he could not see any difference between his jaw and those of other elephants. He hoped to make further investigation into the subject. The evolution of type from the mastodon to the elephant has been referred to. In the mastodon the whole surface of the tooth was covered with enamel; but there was dentine in the interior, and if the cusps were cut off much the same appearance would be found, and the same structure as in the teeth of the elephant. In the long process of development the denticles of the mastodon have been transformed into the dentinal plates of the elephant. This modification is one of the easiest and most obvious he knows of, forming the intermediate step between the Dinotherium and the elephant. There is no evidence that the depressions between the tubercles were ever filled with cementum. There is no trace of it, and no evidence of its ever having existed.

The section was passed, and Section I, Prosthetic Dentistry, Chemistry, and Metallurgy, was called.

Dr. W. B. Ames, chairman of the section, made a verbal report, stating that the section would have no papers to offer. Dr. George Evans would describe a process of enameling gold crowns. The only other matter which they had to present comes under the head of chemistry,—a new oxyphosphate of copper cement, which was a mixture of black oxide of copper and phosphoric acid. The section wished to call attention to a clinic which Dr. Melotte would give on a new fusible metal which fuses at a very low temperature; also a new method of getting a bite for bridge-work.

Dr. Ames also offered a resolution enlarging the scope of the section to take in crown- and bridge-work and orthodontia. The report was received, and on motion of Dr. Peirce the resolution was adopted.

Dr. F. W. Low, Buffalo, asked Dr. Ames what advantage the black oxide of copper had over the oxide of zinc as a component of a filling-material.

Dr. Ames replied that the preparation of oxyphosphate of copper had been offered as a new and possibly valuable contribution to the list of filling-materials. When set, it becomes very dense and hard, and seems to be superior to any other copper filling-material. It can be used at different consistences, but the best results follow its use in the fluid state, which perhaps is a decided advantage, as it can be flowed into the cavity. He has set crowns and bridges with it, forcing them to place, using the preparation in a buttery condition.

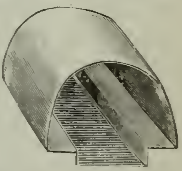
Dr. Low. How rapidly does it set?

Dr. Ames. Very rapidly. In mixing, it is worked on a cold slab, and plenty of time can be taken for the mixing; but the change of temperature when it is placed in the mouth hastens the setting, and the operator must work rapidly, as crystallization when once started goes on quickly. Because of its sensitiveness to changes of temperature it works differently in winter from the way it works in the summer, so that cement intended for use in cold weather is made somewhat different from that for summer use.

Dr. H. A. Smith, Cincinnati, thinks the oxyphosphate quite irritating to the soft tissues. The great objection is its color, but it unquestionably has its place in setting crown- and bridge-work, as it becomes very hard and is almost insoluble.

Dr. George Evans, New York. The effect of heat in the mixing of cement can be overcome by using a bottle filled with ice-water as a mixing-slab. In winter the average temperature of the operating room is say 65° F. In summer it may be 90°, a difference which may materially affect the mixing of the cement. The bottle of ice-water is very handy for the purpose of equalizing the temperature. Dr. Evans then gave a brief description of his method of enameling gold crowns, which he presented with a considerable degree of modesty, he said, because it had not yet been sufficiently tested to determine its absolute value.

After the gold crown is made and fitted to the tooth in the mouth, the sides properly stiffened, the cusps or incisive edge strengthened, it is boiled in acid and then adjusted in the mouth, and the portion of the labial section which is exposed is outlined on the surface of the gold. The crown is then removed, the marked area ground quite thin, and then perforated with a spear-pointed drill. The crown is again adjusted in the mouth, and the thinned labial section depressed to make all the room required for the inlay. The crown is then removed, and glass filling-material of the proper shade is mixed with water to the consistence of paste, a small portion of which is spread over the depressed surface of gold. The surplus moisture is then extracted with a napkin, and any dry particles of the material which may have fallen on the gold removed with a dry camel's-hair brush. The crown is then placed with the enamel upward in a small platinum muffle having a depression in its base to hold the crown steadily. The inside of the muffle is coated with whiting. The muffle is then placed on a charcoal soldering-block, and gradually heated up with a gas blow-pipe, blowing the flame against the closed end. A light red heat will fuse the enamel. The crown is then removed, sufficient enamel added to give proper form to the part, and



the fusing repeated. The surface of the enamel is then ground level and smooth, the edges finished, and the dust removed, after which any pits or inequalities are filled in, the surface being coated by means of a brush with enamel material mixed quite thin, and the fusing again repeated, the heat being carried to a higher point than at the previous fusings. The result is a dense, smooth inlay of enamel.

Dr. A. H. Thompson. Can the shades of the enamel be controlled?

Dr. Evans. The enamel is applied in successive layers, and the color is very well controlled, though not perfectly; but the result is not so objectionable in the mouth as a gold crown or a discolored tooth.

Dr. Patterson. How is the melting of the gold crown avoided?

Dr. Evans. By turning the open end to the operator, and directing the heat at the back of the crown. You will probably melt a crown or two at first in finding out just how to manipulate it, but a little practice makes perfect. The alloy used is three or four per cent. of platinum to gold of .997 to .999.

Dr. Barrett. Wherein does this method differ from the process as presented by Dr. Timme?

Dr. Evans. Dr. Timme's method produces no such results, as he only puts a thin layer of enamel over the gold, which necessarily does not present the appearance of the much heavier portion of enamel which this process supplies. Dr. Littig has also presented a process which is much like this, but it is more complex. The simplicity of this process is its great advantage. In reply to questions, Dr. Evans said that there was no secret in the enamel, which was Dr. Timme's. If the question of priority is raised, we have got to go back to Dr. Herbst, who presented specimens of his methods some years ago at a meeting of this association.

Dr. Guilford wished to confirm what Dr. Evans said as to Dr. Herbst's early appearance in this field. Some eight or nine years ago Dr. Herbst's brother George, while attending lectures, showed his methods of making enamels with pulverized glass and the blow-pipe. What he showed was nothing more, however, than glass beads of different colors. Being of glass they were much more fusible than porcelain, and not so strong. This enamel can be fused on gold because the gold is alloyed with platinum, which raises the fusing point. Another idea which he had derived from Dr. Herbst was the use of platinum crucibles, which he had employed to a considerable extent for several years. Any dentist can easily make them, and they are excellent for small work. Instead of whiting for a lining, he uses asbestos felt. As you all know, it is sometimes desired to do a little soldering in the course of a piece of work without taking the time to make an investment. Thus, for instance, a plate tooth can be converted in a short time into a rubber tooth by soldering on a cross plate. The little platinum crucibles are excellent for this purpose. With regard to glass fillings, many have been interested in them, but he thinks they have not held out their promises very well. There are difficulties in matching shades, difficulties in baking and in setting after they are baked. Glass fillings look well when well made, but they lack the quality of strength. They break out on the corners of the tooth. He could see that if made as Dr. Evans suggests better results would follow, though when made in the ordinary way they get nothing but a weak, porous mass.

The section was passed.

Section II, Dental Education and Literature, was called, and Dr. Louis Ottofy, secretary of the section, read the report, of which an abstract follows.

Following the custom of former years, the section reports five additions to the list of colleges granting diplomas, namely: Dental Department of the Tennessee Medical College, at Knoxville; Chicago Tooth-Saving College, at Chicago; Dental Departments of the Homœopathic Hospital College and of the Western Reserve University, at Cleveland, O.; and Dental Department of the University of Buffalo,—making a total of thirty-eight. The number of graduates has risen from 503 in 1886 to 1483 in 1892, the average in seven years being 904. Of the graduates this year, ten institutions passed more than one-half,—namely, 851,—while fourteen others contributed 91. The three-years' course does not seem to have had the ill effects predicted at the time the addition of one year to the curriculum was requested by this association. On the contrary, the class of students entering the colleges is superior, and they fully appreciate the advantages gained. It will not be long before they will be placed at four years of nine months each.

The list of local dental societies now foots up about 130, having an aggregate membership of nearly 5000. The chairman of the executive committee has issued circulars to these, with a view to increasing the delegate representation in this association, and also with the object of securing material for the section reports. Two years ago twenty-two societies, and last year twenty-four, were represented here.

One of the important advances in dental education during the year is the establishment of reading courses, somewhat after the Chautauqua idea, by the Post-Graduate Dental Association. The courses vary from two to five years, no two alike. Class A, a two-years' course, covering the subjects of crown- and bridge-work and human dental anatomy, is now instituted. The student receives a syllabus and instruction how to proceed in each. In dental anatomy he is required to make a certain number of sections of human teeth, and study the outlines of enamel, dentine, root-canals, etc.; in crown- and bridge-work, practical specimens, in noble or base metals, with written examinations, are submitted, and the association issues a certificate of the proficiency attained. Other courses are to cover a wider range, touching on the borderland of allied sciences. None of them are in any sense to take the place of the college course, but merely to supplement it, and to imbue the dentist with the importance of the scientific, artistic, and literary aspects of dentistry.

The periodical literature of the profession is far superior to that of a few years ago, the general standard equaling that of the medical profession. The journals vie with one another in presenting original matter, freely illustrated.

The committee on dental science and literature of the Illinois State Dental Society stated the needs of the time to be a quarterly journal, of say 600 pages annually, containing nothing but original matter, and a weekly of sixteen or twenty-four pages, to keep dentists *au courant* with dental news as it transpires. "If two journals of this nature could be established, we think they would pay from the start. The weekly could be sold for three dollars per year, and if ten thousand dentists would subscribe there would be an awakening of literary ability.''

The most important additions of the year to the permanent literature are the fifth edition, revised and enlarged, of ''Harris's Dictionary of Dental Science'' ; third edition of Sewill's ''Dental Surgery'' ; fourth edition of Gorgas's ''Dental Medicine''; ''Charts of Typical Forms of Constitutional Irregularities of the Teeth,'' by Eugene S. Talbot, M.D., D.D.S.; second edition of Talbot's ''Irregularities of the Teeth'' ; second edition of Black's ''Descriptive Anatomy of the Human Teeth'' ; the annual volume of Catching's ''Compendium'' ; and ''Dental Jurisprudence,'' by W. F. Rehfuss, D.D.S.

The association then adjourned to 8 o'clock.

(To be continued.)

SOUTHERN DENTAL ASSOCIATION.

(Continued from page 853.)

FIRST DAY—*Evening Session* (Continued).

ON motion of Dr. Chisholm, the president appointed Drs. G. F. S. Wright, J. Taft, and H. E. Beach as a committee on necrology.

The Committee on Prosthetic Dentistry was called, but no report was presented, it being explained that the chairman, Dr. Morgan Adams, was sick.

Dr. R. R. Freeman, Nashville, Tenn., had expected something interesting from the Committee on Prosthetic Dentistry, from the way that he knew the chairman was working. The work had been arranged and subdivided, a portion of it having been committed to the speaker's care, and he had expected that his part would fit in with those of others, making the best and most complete report on the subject ever presented to this association.

When teeth are lost by the ravages of decay, the question arises as to what is the best procedure to restore the loss and bring about the nearest approach to natural function. The first important step is to suspend as near as may be the devastation of the destroying agents by removing the cause if possible, and affording nature the chance to assert its supremacy. Assuming that the parts are restored to a physiological condition, we resort to mechanical art to restore as near as may be appearance, feeling, and function, and the achievements of the dentist along this line stamp him as one of the greatest benefactors of his kind. While some may present novel procedures, which are marvels of art, he would confine himself to the consideration of those cases which have passed beyond the help of what is usually included in modern crown- and bridge-work. In the construction of artificial dentures we are dealing with living structures. If this is not considered, the work will result in failure. The first step is to have a clear plan of what it is expected to accomplish. This can only be secured by intelligent study of the case, and a thorough knowledge of the situation and the surroundings. With the ordinary details we are familiar, but some important points are frequently overlooked. In selecting an impression-cup, for instance, it should be one which is adapted to the case. It is his practice to cut or bend or twist such as he may have to the proper shape, or to even construct one. He never depends on the impression-material extending beyond the confines of the cup. If this is done, you may get imperfect margins, which will only be seen when the work is done.

For an upper impression he would see that the tray should come within one-thirty-second of an inch of every portion where the plate is to rest, the outer rim extending out and above that distance, while the palatal border rested in easy contact on the tissue. With the patient in the proper position, a sufficient quantity of plaster of the proper consistence should be so placed in the cup as to avoid air-bubbles, and if need be a little should be placed in the roof of the mouth when the arch is deep, and back on the protuberance when necessary. The dentist should never let the patient have an idea that the taking of an impression is a disagreeable procedure. He should look the captain of the situation, and be it. Pass the cup into the mouth, and bring it into position quickly, but not hurriedly, drawing out the cheek, then the lip, first bringing the plaster firmly against the alveolar border down and forward, and then press it upward. These movements are all to be made before the plaster begins to set. Hold the cup steadily, with only sufficient pressure to prevent displacement, but with a tendency as though to draw the cup downward and outward. The parts are thus relaxed, so that when you get a model it will fit, and not be pushed out of place, as would be the case if the parts were compressed when the impression was taken. When the teeth are set in place, let the plane of mastication fall lower in the rear than in the natural occlusion, and there will then be less likelihood of the plate being displaced during mastication, and the tendency of the plate will be to become firmer and firmer in its position, instead of requiring constant sucking and readjusting on the part of the patient to keep it there.

There is less complaint of difficulty with upper plates than lower, but it is just as easy to construct a lower denture as an upper. He should manage the cup in the same way as for an upper case, only there is a greater tendency for the mucous membrane to become enfolded. He would let the cup extend a little beyond the line or border where the plate is to rest, more especially up and back along the ramus and well down along its side. He uses a cup with deep wings, which forces away the tongue at the base. Such a cup is especially adapted to the mouths of very fleshy persons, where there is apt to be an excess of overlying tissue.

A plate may be ever so well constructed so far as adaptation and occlusion are concerned, but if it does not extend well back and up along the rim it will wabble. It is not always necessary that there be a well-developed arch to have a lower plate rest firmly, if this precaution is taken of extending the plate well back. In addition to this, he wished to call attention to a little device of Dr. F. E. Beach, of Franklin, Tenn., who forms a well-defined ridge around the external border, say within one-eighth of an inch of the gum-margin. After the case is waxed up for flasking, he passes around it a piece of twine well saturated with wax. A puff of the blow-pipe causes it to adhere, and when reproduced on the plate it affords a line which the lip will take hold of, and in many cases cause it to adhere with considerable tenacity to the jaw.

Dr. A. P. Johnstone. There are a few cases in the lower jaw where we find it very difficult to get palatal plates to stay in the mouth. He had a patient recently with whom he had this experience. In the lower jaw there was nothing to hold the plate down unless you could get some teeth to lock it to. This patient had no teeth from the cuspid on one side to the second molar on the other. He crowned these two teeth, and made a plate which could be clasped to the crowns.

Dr. Browne uses modelling composition in taking impressions, and instead of pressing the composition home with the fingers he puts the tray where it ought to be, then tells the patient to bite on it. Another little point which has been practiced and published for fifteen years or more, although it is not generally regarded, is to line the plate in a limited space with soft or flexible rubber, something like palate rubber. It is especially useful in the mouth of an old person. The method of accomplishing it is as follows : After packing and closing the flask, with the linen on the rubber, cut the flexible rubber the size of the air-chamber, place it in the position of the air-chamber, then close the flask and vulcanize, then scrape the lingual side till the flexible rubber is seen, not felt, because we want to leave sufficient to give rigidity. This plan gives flexibility at that point, and with it you can make a plate stay in any mouth. If the mouth is almost as flat as the palm of your hand, with the process all gone, the flexible rubber can be extended almost over the plate, but in ordinary cases putting it just over the air-chamber will do. It is also a useful procedure to line lower plates, which is accomplished by closing the flask as in ordinary cases, then opening and putting on two thicknesses of this flexible rubber, then close again and vulcanize. Flexible rubber is not so durable as other rubbers. It seems to harden and sometimes shows cracks, but its use in this way enables the patient to become accustomed to the plate, and it gives good service.

Dr. W. H. Marshall, Oxford, Miss., saw recently an anchor denture inserted by Dr. Morgan Adams a year ago. There was one bicuspid on the right side below, and no teeth back of that. This bicuspid was crowned, and the plate was anchored to that with a simple rim. Last week the case was in a healthy condition. He also called attention to the case which he had brought before the association last year. It was a full upper set anchored to a right cuspid. The patient has been wearing the plate continuously for eighteen months. The plate is tight, the gum around the tooth is healthy as it ever was, and the band fits about as accurately as the one on the model shown. It is not necessary to have the band fit perfectly tight if only one cuspid is used in anchorage.

Dr. L. P. Dotterer, Charleston, S. C. Would it not be better to have a telescope crown, so as to take the pressure off the gum?

Dr. Marshall replied that he did not want any pressure on the crown, but wanted all the pressure on the gum. In answer to another question, he said that he preferred one to two cuspids for anchorage, because it was almost impossible where several teeth were used to get the attachments parallel, and if these were not parallel there would not be a good result.

Dr. John R. Thompson, Atlanta, Ga., had been experimenting in this direction, having got the idea from Dr. Marshall, only he made his appliance in the form of a removable bridge. He showed models of a case, and said that in the plan he followed only the use of metal models was new. In this case only the cuspids remained. These were cut down and crowns fitted. After crowning, he made telescoping bands and attached the plate to them. This process was the most satisfactory that he had been able to use. It does away with covering the roof of the mouth in the case of upper teeth, and gives a good, firm lower denture. There is considerable advantage in the use of metal models, which are made of block tin. He uses this almost exclusively, making them from the plaster cast. One special advantage of this plan is that if by any accident the plate is broken, it can be replaced without the necessity of taking another impression. It is also useful in the articulation of the teeth, and a plate made over metal molds comes out beautifully polished and much harder than when vulcanized on the plaster, and resists the fluids of the mouth better.

Dr. Chisholm was much interested in Dr. Marshall's method. He had one case of a gentleman, sixty years of age, who was wearing a complete upper set except the wisdom-tooth, which was used to anchor the plate upon. At the time the plate was inserted the wisdom-tooth was loose, but it had got tighter after the plate was in position. He had also one case of a man nearly seventy years of age, who had lost all his teeth except two wisdom-teeth, and there was very great wasting away of the gum. There was some difficulty in getting the sides of the teeth straight, so as to provide anchorage, but the case was successful. One point that should be borne in mind in flasking the anchor-plate is that the two halves of the flask must not have any play.

Dr. Geo. Evans, New York, described a method of making a telescoping crown. If to fit over a gold crown, the crown is first removed, a strip of dampened paper is wound around it and held with a string. Melotte's fusible metal is melted and poured into the crown and paper tube at a low heat, forming a die of the crown with a shank attached to it. A strip of pure gold about 30 gauge, wide enough to reach from the neck to or slightly above the occluding surface, and with about one-third of it near the middle say half as wide again, forming a lug, is then fitted evenly but not tightly around the crown, the ends being placed opposite the point where the piece will be joined to the bridge. The collar is then removed, the ends soldered, and the lug bent over the occluding surface till it nearly meets the edge of the collar. A piece of gold clasp plate, No. 30 gauge, somewhat narrower than the collar, is then adjusted to the collar in such position that the latter shall extend beyond it at top and bottom, removed and the ends soldered, readjusted on the collar, removed with it and the two soldered together, using only enough solder to unite the parts. The collar is then trimmed smooth, the bent-over lug adjusted and soldered to it, forming a partial cap. The gold crown is then dropped into a ladle of melted fusible metal, to free it from the fusible metal to which it was attached, and then immersed in nitric acid to eradicate any traces left after the melting out.

A telescoping crown can be made for a natural tooth after the same method by taking an impression in plaster of the crown after its sides have been trimmed straight, and making a fusible metal die and proceeding as described.

Dr. H. E. Beach. Dr. Freeman has referred to a device for holding lower plates. When that method is understood, if it is as successful in all cases as in the instance where he saw it, it is certainly well worthy to be studied by every dentist. The plate that he saw was in the mouth of an old gentleman who had had a great deal of trouble with his artificial teeth until this device was tried. When he was asked to take it out of the mouth it was somewhat difficult to dislodge, though he said that it fit easy. With reference to the anchor-plate, this is not a modification of the old-fashioned clasp-plate, as many think, and those who do think so should get rid of the idea at once for the sake of their patients. It is very efficient for partial plates. Where the crown surface of a molar is in perfect condition it is not necessary to crown it; only put on it a perfectly fitting band, and telescope another band on this. His method of telescoping teeth is as follows: After making the crown, remove, fill the band with plaster, with a little salt in it to facilitate setting. Then wrap No. 40 tin foil right around the band, and mark just where the telescoping band is to come; then cut to just the shape of gold and make the band. Readjust, and make an exact pattern of what is to be gold, and cut the gold by the pattern. Trim exactly and bring the ends together, put on and burnish down. When the crown and the band are ready, adjust the crown, and telescope on and mark just where to make the attachment and put on the lug. This method gives excellent results for two or three teeth, where there is a bicuspid or first molar to attach to.

Dr. S. S. Cook, Chattanooga, thinks that nothing excels rubber vulcanized over a metal plate.

Dr. Browne makes his models of tinner's solder,—not that it is any better than block tin, but that it is more easily obtained. He takes an impression, and puts it over the stove with the solder in a ladle, and when the metal is melted the impression is dry enough to have the metal poured in. He doesn't care to have the impression perfectly dry, but is careful to pour the metal slowly. When a rubber plate is made on one of these models, it is difficult to get it off.

Dr. Cook. Where there are overcuts and undercuts in the impression, and you expect difficulty in taking off the plate, it can be obviated by using bits of isinglass or mica. Make the model in sections, and then the parts can be put together, then vulcanized.

Dr. Beach. The difficulty with models made of tinner's solder is that they are apt to melt in vulcanizing, unless carefully watched.

Dr. Browne replied that he had had no difficulty of that sort.

The subject was passed, and the association adjourned till the following day.

Second Day.

The morning session was devoted to clinics.

Afternoon Session.

The association was called to order at three o'clock, President White in the chair.

The election of officers was proceeded with, resulting as reported in the Dental Cosmos for September.

Dr. J. N. Crouse, chairman of the Dental Protective Association, made an address defining the objects of the association, and presenting a statement of the work it had accomplished and of its present status.

Dr. E. P. Beadles offered a resolution of thanks to Dr. Crouse, pledging his association the support of the members of the Southern Dental Association, which was adopted unanimously after several of the members had related their experiences with the evils which the Protective Association was formed to combat.

Dr. Crouse was elected an honorary member of the Southern Dental Association by a rising vote.

Dr. R. K. Luckie, Holly Springs, Miss., moved that a committee of three from each southern state be appointed to solicit members for the Dental Protective Association.

Dr. Beadles suggested that the incoming president take time to appoint the committee, so as to assure the best men possible. The suggestion was accepted by Dr. Luckie, and the motion was then adopted.

Adjourned till 2.30 P.M. the next day.

THIRD DAY.

The morning session was devoted to clinics.

Afternoon Session.

The association was called to order at 2.50 P.M., President White in the chair.

Dr. B. Holly Smith, Baltimore, called attention to the classification of dentists as manufacturers by the superintendent of the census, and offered a resolution protesting against this action.

The resolution was adopted.

Dr. Smith also moved that a committee of three be appointed to act in conjunction with the general committee having charge of the matter, and with a committee from the American Dental Association, to raise funds to fight the classification, should that be necessary.

The motion was adopted, and Drs. Stubblefield, Thompson, and George Eubank were appointed.

The Committee on Dental Pathology and Therapeutics was called, and a report was read by Dr. W. J. Barton, of Paris, Texas. An abstract follows:

It is in the line of pathology and therapeutics that dentists are most brought in contact with physicians, and this field therefore affords the greatest opportunities for the cultivation of harmony and the fraternal relations which should exist between them. Unnecessary criticism on either side is out of place. The better way is to combine the knowledge of both upon the treatment of cases in which both are interested. Among exciting causes of pathological conditions of the gingival margins and the peridental membrane is the impingement of bands placed there in crown- and bridge-work operations. These sometimes extend too far under the margins of the gum or are badly fitted, and the tendency is for the production of constant irritation, which may result disastrously. Dr. Barton passed around models of a case of bridge-work which nature had removed, after a brief period of usefulness, because of irritation set up by ill-fitting bands. He also wished to direct attention to the contused condition of the necks of teeth sometimes caused by the pressure of clamps. Many clamps are made with too sharp points or edges, or the spring is too stiff, producing an effect upon the dentine at the neck of the tooth somewhat like that resulting from the application of forceps, a condition which is very likely to develop into caries. In teeth of extra vascularity, enough animal matter remains in the tubuli of the dentine to cause a pathological condition of the pericementum after the pulp has been removed, unless unusual antiseptic precautions are taken. Protection is needed for inflamed sensitive tissues such as we find in decaying dentine. It has lost its natural protective covering, the enamel. If it is properly protected, nature may repair the damage. It is for this reason that we fill. A metallic filling may not be a sufficient protection for the inflamed tissue ; but if we establish also permanent antisepsis, we have done all that can be done. In carrying out the antiseptic principle, we use the oily dressings or varnishes and nitrate of silver where fillings are not applicable. Nitrate of silver is also valuable for application in cavities of decay, especially in children's teeth, which, because of sensitiveness, cannot be properly excavated. In such cases it seems to afford the protection required. Loss of function is also an important factor in the impairment of the vitality of the teeth and their supports. He wished also to direct attention to the possible hereditary influence of indiscriminate extraction. One of the effects following the loss of a tooth is a deterioration of the peridental membrane, which is not reproduced in its integrity,—a fact which may perhaps explain the cause of pyorrhea alveolaris, and why it is often incurable. It may be objected that the excision of a part of an appendage or of an arm does not result in the hereditary loss of the parts cut off ; but it is to be borne in mind that every tooth is a separate and complete organ in itself, which constitutes a vast difference. Half the children born are from more or less edentulous parents, and he was ready to believe that this, continued through many generations, must have its effect, more especially in the deterioration of the peridental membrane. This country affords wide opportunities for the study of this condition. Americans have almost the poorest teeth in the world, a state of facts which he was prepared to believe was largely due to the fact that there was more extraction here than anywhere else. The report concluded with the announcement of several papers to be read.

Dr. John S. Marshall, Chicago, Ill., wished to draw the attention of the members to the use of electricity in dental surgery as a therapeutic agent. In medicine and surgery it has a very wide range of application in this direction. Thus it is used with happy effects very frequently in neuralgia, in paralysis, in troubles due to sluggish circulation, in hyperemias, etc. Its advantages are not so well understood among dental surgeons, but as it becomes more known he felt confident that it would be more appreciated. Some particular applications in our specialty of which he wished to speak are in the treatment of hyperemic conditions and in the abortion of benign tumors. The currents generally employed are the continuous galvanic and faradic. The positive galvanic current is most to be relied on in hyperemia, because it has a tendency to produce anemia in the part to which it is applied. The negative current, on the contrary, produces a congested condition. The faradic increases circulation. The particular field for the employment of electricity to which he desired at present to direct attention was the use of the positive galvanic current in the treatment of congested conditions of the dental pulp. It is best when applying the current to use a galvanometer, or you are liable to turn on too much. Three-fourths of a milliampere is all that can be used safely at first; afterward it can be increased to say one and one-half milliamperes, but beyond that it is unendurable. The usual period of an application is from ten minutes to half an hour. When using the continuous galvanic current no break is necessary from the first application of the electrodes until the sitting is concluded; if broken in the mean time, a slight shock is caused, but this acts rather as a stimulant. The faradic current is not so useful in this class of troubles, because it is not continuous. He has also used the electrode in the exhibition of medicaments, with excellent effect. Just how it acts in increasing the effect of the medicaments he does not know, but he supposes that it either increases the absorptive power of the tissues or assists in driving the medicaments in. The faradic current is excellent to test teeth for vitality, a question which, as all dentists know, it is sometimes extremely difficult to decide. In cases where the usual tests, even including the electric light, fail, the faradic current will tell very quickly whether the tooth is alive or dead. Only one-half or three-fourths of a milliampere can be comfortably borne by a live tooth; but in the case of a non-vital tooth the force of the current can be increased up even to two milliamperes without causing discomfort.

Dr. S. W. Foster, of Decatur, Ala., read a paper on the "Care of Children's Teeth," an abstract of which follows:

The treatment of children's teeth is the most important subject that presents itself to the considerate dentist to-day. It is the exception when proper treatment will not result in correct occlusion and a perfect permanent denture; and although the subject has been treated with indifference by the majority of American dentists, the essayist was glad to note an awakening along this line among many practitioners. Failure to understand dentition and the treatment of its pathological changes, and to disseminate this knowledge among parents, evinces a gross neglect.

A prime essential is perfect co-operation on the part of parents, to the end, in the first place, that the child shall not in advance dread a visit to the dentist. Where through inadvertence or carelessness this feeling of dread has become developed in the child, patience, persuasion, gentleness, and firmness will overcome it. As Dr. Freeman has said, "To secure the ideal of perfection, the time to commence the care of children's teeth is three generations before they are born." While pre-natal existence cannot be controlled, by properly educating parents we can hope, in a few generations, to bring about grand results. To this end dentists should impart their best information as to early decay and its therapeutics to their patrons, and insist that the public schools shall teach the facts concerning pathological conditions of the dental organs. While grand work may be accomplished in this direction, untold achievements are to be gained by the present application of such available skill as is possessed. The writer holds to the belief that it is almost the exception where there are no pathological attendants upon the first dentition of children. It therefore behooves dentists to see that the eruption of the temporary teeth is accomplished with as little irritation as possible. Pure, healthy food for the infant is a necessity,—wherever possible, mother's milk entirely, until there is an unbroken row of teeth in each jaw. An abundance of exercise, fresh air, and sunshine, with perfect cleanliness of the body, including the oral cavity, is necessary. He had failed to find a recorded case of scurvy where the child was nourished exclusively from its mother's breast, which nourishment also greatly lessens the tendency to rickets. The uræmic diathesis is rarely found associated with good teeth. Where difficult dentition occurs in spite of every precaution, the writer is an ardent advocate of the free use of the gum-lancet.

One of the prime causes for early decay of the teeth is failure to keep them clean. If children's mouths could be kept perfectly sterilized to the age of fourteen years, and the principle of cleanliness instilled into their minds, caries in later life would be the exception. The writer has found it a good plan, after placing the teeth in a sanitary condition by cleansing away all deposits and stains, to apply beech-wood creasote. He deprecated extraction of deciduous teeth except when absolutely necessary. They should rather be treated, filled with some of the plastics, and so kept until replaced by the permanent set. A perfect digestive apparatus is impossible without proper mastication, which cannot be performed in a mouth filled with decayed and aching teeth.

(To be continued.)

DENTAL SOCIETY OF THE STATE OF NEW YORK.

(Continued from page 845.)

Discussion on Dr. Westlake's Paper on "Electricity." *

DR. L. ASHLEY FAUGHT, of Philadelphia. I am glad Dr. Westlake has brought this paper before us. The subject of the application of electricity for therapeutic purposes in dentistry is new. Hitherto we have been in the habit of looking upon it as a motor power principally, and even then we only had a primary knowledge of it. If you turn to the literature of dentistry, you will find how very poor it is on the subject of electricity, and how little seems to be known in regard to the use of it. Therefore I am glad to have this contribution to the subject, and particularly as the essayist begins at the beginning and takes up the nomenclature, so we may have a definite idea of that which is understood by him. So far as its application for the purpose of obtunding sensitive dentine is concerned, I believe there is a great field for electricity in the future. My attention was called to this some time ago, through some experiments of my brother, a physician in Philadelphia, who has been engaged in its application for the removal of superfluous hair, and the painless condition with which that could be performed led me to believe that perhaps some application of it to the teeth would aid us. I may say that my experiments did not give the result which I hoped for, and as my mind at that time was turned toward the application of electricity for the insertion of gutta-percha fillings, I dropped the subject, and have not taken it up since.

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* Printed in full in the current number, page 887.

The use of electricity, not only in itself, but the power which it possesses under proper conditions of driving anodynes into affected parts, is a very good one, and I think there is a wide field there. I hope to speak further after I have made more experiments.

There is another thing which Dr. Westlake appreciates: that is, that no laws can be laid down for the amount of force to be used. It will depend upon the constitution of the patient. A certain force used on one person will prove so excessive in another case as not to be beneficial. When it is used, we must begin very cautiously with a very low current, and experiment until by a proper diagnosis of the condition of the patient we learn to apply the right force.

Dr. Westlake. The only object that I had in bringing this subject before the profession was to introduce it. It is without question a subject of vast possibilities. My object here is to consider the physiological therapeutic effect of electricity. I have not had an opportunity to experiment sufficiently, or to do more than open the discussion of the subject before the profession. The question of the possibility of obtunding sensitive dentine by electricity I believe will be accepted as a fact in time. The question of forcing medicines into the tissues by electricity is an accepted scientific theory.

Electricity must be handled in a very competent and careful manner. The operator must appreciate the diagnostic and therapeutic effects; he must understand the temperament of his patient. A very nice gauge is to have a milliampere meter to gauge the force or resistance of the patient; that is necessary in order to understand what amount to give.

Inflammations are reduced very quickly, and cases of pericementitis are handled beautifully by it, by means of the galvanic or faradic current. The latter has a very good effect where the teeth are hypersensitive. I have seen beautiful results from stimulation of the pulp. It acts very nicely in neuralgia, and it is not painful when applied properly. It is a stimulator of the muscles. If a man does not want a gymnasium in his house, if he has an electric battery, and has the proper current, he can develop the muscles in any part of his body.

When I make an examination of the mouth I take this small lamp, put an asbestos coat over that [illustrating], close my sliding doors, and make the examination. In using the faradic current, if we want to use it in operations on the gum, two electrodes are taken, one applied on each side of the gum, and it is wonderful what a stimulation there is to the tissue. For the application of medicine the electrodes are made cup-shaped, and whatever medicine is wanted is placed on cotton in the cup and is forced right through the tissue by the current. To give an instance of how it was applied in my personal experience: The other evening, jumping on a car, I fell and struck my knee. There was some swelling when I reached home, and I took the electrode, saturated the sponge with iodine and aconite, and passed it over for about two minutes. The next day it was entirely well. I think it was due to the stimulation of the tissue in connection with the iodine and aconite.

Dr. W. C. Barrett. Regarding the importance of electricity, I want to say a word. We have not paid the attention to it that we should. We have used it for mechanical purposes only. Let us get out of that rut, and use it because it is an important remedy. I have not been without it for years, and I never expect to be without it hereafter. There is not often a time when I do not have more or less cases requiring the use of electricity. I have two cases of facial paralysis at the present time. One has been under the care of physicians for years without benefit, and yet with the use of the battery, carrying the current over the trifacial nerves, I hope to cure it. You would not see, in one case, that there had been any facial paralysis at all. With the current I have so stimulated the facial nerve that the patient has almost entirely recovered the functions of the nerve.

I use the faradic and also the direct current. It is largely the faradic current which you will need. I also have a magneto-electric machine, and sometimes I can get a violent stimulation from that; also the effects that you get from the cataphoric current are sometimes extremely important. You can by that means drive the remedy directly in. In cases of induration of the tissues, I have used tincture of iodine and the current, which seems to cause a direct penetration into the very point you need it. We must comprehend these things. We must have them, if we are going to practice anything but mechanics. We must use electricity for medicinal purposes. It may be largely used in the mouth, and we should have it at our command, and be enabled to use it for its medicinal effects.

(To be continued.)

COLORADO STATE DENTAL ASSOCIATION.

THE sixth annual meeting of the Colorado State Dental Association was held at Denver, Col., June 7 to 9, 1892.

Papers were read by Drs. P. T. Smith, A. H. Sawins, T. C. Chamberlin, and Dr. Donaldson, and a clinic was given on removable facings in bridges by Dr. E. A. Bryant.

The association pledged its financial support to the examining board in the prosecution of violators of the dental law, and a fund of fifty dollars was appropriated for the immediate use of the board.

Appropriate resolutions were passed upon the death of Dr. R. J. Burns, of Denver.

The liability of dentists for jury duty was fully discussed, and it being developed that no law existed exempting them, a committee consisting of Drs. R. B. Wiser, J. M. Norman, and S. Davis was appointed to secure the passage of such a law, and to look after all legislation affecting dentists.

The following officers were elected for the ensuing year: J. M. Norman, Denver, president; J. H. Beals, Denver, first vice-president; Robert Kettner, Trinidad, second vice-president; W. A. Smith, Salida, recording secretary; Sarah May Townsend, Denver, corresponding secretary; and William Smedley, Denver, treasurer.

Adjourned to meet at Denver on the first Tuesday in June, 1893.

FLORANCE D. COVERT, *Corresponding Secretary*,
306 Mack Block, Denver, Col.

WEST VIRGINIA STATE DENTAL SOCIETY.

The first annual meeting of the West Virginia State Dental Society was held at Wheeling, October 5, 1892.

The president's address was delivered by Dr. H. H. Harrison, and papers were read by Drs. J. Taft, J. N. Mahan, J. G. Templeton, H. K. Jones, C. H. Bartlett, and G. W. Gandee. A clinic was held by Dr. J. W. Lyder.

The following officers were elected for the ensuing year: J. N. Mahan, Charleston, president; R. W. Tener, Wheeling, vice-president; H. K. Jones, Parkersburg, treasurer; and G. I. Keener, Morgantown, secretary.

George I. Keener, *Secretary.*

CALIFORNIA STATE BOARD OF DENTAL EXAMINERS.

At the last annual meeting of the California State Board of Dental Examiners, held August 4, 1892, there were twelve applicants examined, of whom two were successful.

The following officers were elected: J. L. Asay, San José, president, and J. D. Hodgen, San Francisco, secretary. The other members of the board are S. E. Knowles, W. F. Griswold, and Thomas Morffew, all of San Francisco; John C. McCoy, Santa Ana, and F. F. Tibbets, Sacramento.

DENTAL ASSOCIATION OF THE PROVINCE OF NOVA SCOTIA.

The second annual meeting of the Dental Association of Nova Scotia was held at the Church of England Institute, Halifax, N. S., September 28 and 29. The meeting was one of great interest. The papers and clinic were of a high order, and augur well for the future of the society. It has a membership of seventy-two.

The officers for the ensuing year are A. C. Harding, president; H. E. Eaton, first vice-president; H. Clay, second vice-president; F. Woodbury, secretary.

The Provincial Dental Board met on September 28, for organization for the ensuing year. The members are as follows: A. C. Cogswell, president; Frank Woodbury, secretary-registrar; H. Woodbury, J. A. Merrill, M. P. Harrington, George Hyde, W. C. Delaney.

The next annual meeting of the association and board will be held in Halifax in September, 1893.

The S. S. White Dental Manufacturing Co. added a very interesting feature to the meeting of the association by giving the finest display of dental instruments and supplies ever seen in the maritime provinces.

Frank Woodbury, *Secretary,*
137 Hollis street, Halifax, N. S.

DENTAL SOCIETY ANNOUNCEMENTS.

PERMANENT OFFICERS OF THE WORLD'S COLUMBIAN DENTAL CONGRESS.

At a meeting of the Executive Committee of the World's Columbian Dental Congress, held at the Grand Pacific Hotel, Chicago, October 22, 1892, the following permanent officers were elected:

PRESIDENT.

L. D. Shepard, Boston, Mass.

VICE-PRESIDENTS.

W. W. H. Thackston, Farmville, Va.
A. L. Northrop, New York city.
W. H. Morgan, Nashville, Tenn.
W. W. Allport, Chicago, Ill.
W. O. Kulp, Davenport, Iowa.
C. S. Stockton, Newark, N. J.
Edwin T. Darby, Philadelphia, Pa.
H. J. McKellops, St. Louis, Mo.
J. Taft, Cincinnati, O.
J. H. Hatch, San Francisco, Cal.
J. B. Patrick, Charleston, S. C.
J. C. Storey, Dallas, Texas.

SECRETARY-GENERAL.

A. W. Harlan, Chicago, Ill.

ASSISTANT SECRETARIES.

George J. Friedrichs, New Orleans, La.
Louis Ottofy, Chicago, Ill.

TREASURER.

John S. Marshall, Chicago, Ill.

OHIO STATE DENTAL SOCIETY.

The twenty-sixth annual meeting of the Ohio State Dental Society will be held at the Neil House, Columbus, December 6, 7, 8, and 9, 1892.

A cordial invitation to be present is extended to members of the profession in general. Ample accommodation and opportunity will be given for the exhibition of appliances, etc. Correspondence is solicited from those having anything new and useful to offer for the advancement of dental science.

Otto Arnold, *Secretary*, Columbus, O.

EDITORIAL.

POST-GRADUATE DENTAL EDUCATION.

The demands which anything like a full dental practice make upon the scientific and technical capabilities of the dental operator are so elaborate and manifold, that the time-limit of the usual college course for the acquisition of a dental education is far from sufficient. The most that has been absorbed when the diploma has been won is a knowledge of the more important principles, a familiarity with typical methods, a limited facility in technique, and what is equally important, if not more so, the establishment of a habit and method of study, giving the ability to readily acquire further knowledge and practically apply it as occasion arises. The need for fuller preparation and a better educational equipment to broadly meet the requirements of successful practice is one constantly felt by all practitioners more or less, and is a need so general that the question of how to fully satisfy it is one of the present vital issues in dentistry. A prominent manifestation of this desire for a broader dental culture is the demand which is constantly made upon the colleges for more extended and elaborate curricula and an increase of the time-limit of their courses. This has so far been ably met, and, when all sides of the question are fairly considered with a proper discrimination respecting the demands of extremists in dental educational matters, the present college course in dentistry is amply capable of fulfilling the office for which it is designed and which it promises to perform, viz., of fitting students to intelligently undertake the practice of dentistry. More than this, when the marvelous developments of the scientific and technical departments of dentistry, with the resulting increase in the mass of educational data which the student must master, are taken into account, the present curricula of our reputable dental educational institutions give evidence of a full recognition of this need. It is admitted, but it should be broadly understood, that at the best a dental college education is but a preparatory step, the beginning of an individual self-education which is or should be continuous throughout the professional life of the practitioner.

A realization of the incompleteness of his dental education usually overtakes every new graduate at an early period in his practice, with the result, as a rule, of stimulating him to further study in the lines where he is weakest. This habit, once set up, becomes one of the surest factors in professional success ; it is a necessity to every man who would keep abreast with the constantly increasing flood of new methods and the tide of rapid scientific advancement which dentistry is continually making.

The habit of systematic study is one which is not difficult to acquire ; it is, in fact, the natural tendency of all whose love for dentistry is something deeper than a mere lip-phrase, and whose dental ideal is not wholly measured by its relation to the bank account. No practitioner need be so busy that a fair knowledge of the contents of the best dental periodicals or the standard text-books is beyond his reach. The practitioner who allows his practice to absorb all his time does not own his practice ; his practice owns him, and he becomes simply a machine, working by machine methods and incapable of any but routine work.

Systematic self-culture in dentistry, though not a difficult matter to those who have acquired the habit of study, presents difficulties to the untrained which to many are insurmountable without help. The organization of the Post-Graduate Dental Association of the United States by men prominent in educational matters, with a competent educational council, is a worthy effort, embracing somewhat of the Chautauquan idea, designed to popularize and systematize post-graduate study, and should receive the encouragement from the dental profession to which its value and importance entitle it. In its scheme, provision is made not only for post-graduate study, but systematic preparatory reading courses for self-instruction for those who intend taking the college course, and for the large class who for any reason are unable to take the regular college course, but desire a fuller knowledge of dental subjects. Such a work, faithfully performed, cannot fail to exert a potent influence toward improving the average of professional standards, not only as an adjunct to the colleges by improving the educational fitness of the graduates, but by bringing about a similar improvement in the class of practitioners who have not had the advantage of the college course of instruction, and who yet form the major part of the dental profession.

WORLD'S COLUMBIAN DENTAL CONGRESS.

WE print elsewhere the announcement of the election of the permanent officers of the World's Columbian Dental Congress, and we take pleasure in congratulating the dental profession, as well as the Executive Committee, on the judgment and wisdom which they have shown in the selection of men to fill these important positions.

To those who know him, and are aware of his ability as a presiding officer, no indorsement of Dr. L. D. Shepard as president will be needed. It would be difficult, if indeed it were possible, to name a man in the list of American dental practitioners more eminently qualified for this delicate and responsible position, or one who will more acceptably and honorably fill it.

Dr. A. W. Harlan as secretary-general will be ably assisted in his department by Drs. Friedrichs and Ottofy. The perspicacity of the Executive Committee is fully demonstrated in this selection. Dr. Harlan's ability and experience in this kind of work, and his extensive acquaintance with members of the dental profession throughout the world, are qualifications which guarantee the satisfactory conduct of this most important department.

The appointment of Dr. J. S. Marshall as treasurer and the judicious selection of the twelve vice-presidents complete a list of officers of whom American dentists can justly feel proud, and we wish them Godspeed in their arduous labors, in the full assurance that they will be crowned with a brilliant success.

BIBLIOGRAPHICAL.

Note-Book for Dental Students. (Dental Anatomy and Physiology.) By James F. Rymer, member of the Royal College of Surgeons, England; Licentiate in Dental Surgery of the Royal College of Surgeons, England; Doctor of Dental Surgery, University of Pennsylvania. Second edition. Pp. 64. Price, cloth, 60 cents. London: Claudius Ash & Sons, Limited, Broad Street, Golden Square, W., 1892.

This little work consists of a well-arranged series of short definitions of terms pertaining to dental anatomy, human and comparative, as well as a description of the anatomical elements of the dental tissues with their physiology. It covers the whole field fairly well, and places in convenient form and compass most of the salient points embraced within the limits of its title. As a suggestive help and short reference-book, it should be of value to the dental student, for whom it is especially designed, and to a considerable degree useful to the dental practitioner.

OBITUARY.

DR. A. J. BAZIER.

Died, in Gothenburg, Sweden, January 22, 1892, of Bright's disease, Dr. Augustus John Bazier, in the seventy-fifth year of his age.

Dr. Bazier was born in Philadelphia, Pa., August 26, 1817. In his youth his desire to see something of the great world led him to make two sea voyages as cabin-boy. On his return from the second voyage he apprenticed himself to Snowden & Warren, surgical-instrument makers, of Philadelphia, with whom he served his full time. Not liking this trade, however, he took up the study of dentistry, and afterward practiced for some time in Philadelphia. In 1852 he went to Gothenburg, Sweden, where, after passing an examination before a board of examiners, he received their diploma, and practiced in that place for sixteen years, and subsequently in Stockholm for eleven years. He then went to Switzerland, where he was in practice for three years in Lausanne, and then to Paris, and after a practice of two years there returned to Gothenburg, where he followed his profession up to the time of his decease.

During his long professional career in Sweden, Dr. Bazier was held in high esteem, not only for his skill as a dentist, but for his excellent qualities as a man. He had as patrons the royal family at Stockholm, members of the diplomatic corps, and many of the most intelligent and influential classes of citizens. He was an honorary member of the Swedish Odontological Association, and at one time president of the Scandinavian Dental Association.

Dr. Bazier was married in Philadelphia, July 5, 1839, to Elizabeth Runyan Peale, a granddaughter of Charles Wilson Peale, the celebrated portrait painter and founder of Peale's Museum in this city. She died in Paris in 1883. Four children survive them, two of whom reside abroad and two in this country, one as a practicing dentist in Chicago. The Dental Cosmos subscription list has long carried the name of Dr. Bazier, showing that, though the greater portion of his life was passed abroad, he kept always in touch with the advancement of his profession and its literature. From an affection for his country, he ever remained an American citizen.

DR. HENRY J. MOUZON.

DR. HENRY J. MOUZON died July 13, 1892, at Spartanburg, S. C., having been in the active practice of dentistry about twenty-five years.

He studied dentistry with Dr. Wardlaw, at Abbeville, S. C., in 1868, and became a very expert operator; was a painstaking, faithful, and successful dentist. He was precise and particular in all that he did, and his conscientious discharge of the difficult requirements of a laborious country practice broke down, prematurely, his health, so that for two years prior to his death he was a great sufferer from rheumatism and neuralgia. He was of an inquiring disposition, and was continually engaged in experimentation, which resulted in a number of useful discoveries and inventions. The profession of his state has lost in him an honored and useful member. W. C. W

DENTAL LEGISLATION.

NEW YORK'S AMENDED DENTAL LAW.

FOLLOWING is the amended and extended dental law of the state of New York, which was approved by the governor and went into effect May 12, 1892. It is entitled "An act to amend chapter one hundred and fifty-two of the laws of eighteen hundred and sixty-eight, entitled 'An act to incorporate dental societies for the purpose of improving and regulating the practice of dentistry in this state,' and to codify the laws regulating the practice of dentistry, and to punish forgeries and frauds in medical and dental diplomas."

The People of the State of New York, represented in Senate and Assembly, do enact as follows:

SECTION 1. No person shall practice dentistry, either as principal, agent, assistant, or employee, in the state of New York, or advertise or hold himself out to the public as so practicing dentistry, who shall not be licensed and registered as prescribed by this act. Any person who shall practice dentistry or advertise or hold himself out to the public as practicing dentistry in violation of this section, shall be guilty of a misdemeanor, and upon a first conviction thereof shall be punished by a fine of not less than fifty dollars; and for every conviction of said misdemeanor subsequent to the first the person convicted shall be punished by a fine of not less than one hundred dollars, or imprisonment, or by both fine and imprisonment.

SEC. 2. A person only shall be deemed to be licensed to practice dentistry in this state who shall have attained the full age of twenty-one years, shall have had properly granted to him or her, either by the Dental Society of the State of New York or by an incorporated medical or dental school or college approved by the Dental Society of the State of New York, a proper diploma conferring a recognized medical or dental degree, and shall have made the registration required by section three of this act; provided, further, that no diploma shall be deemed valid within the provisions of this act if conferred irregularly, through fraud or false representation or without substantial compliance by the person to whom it may have been granted or the corporation conferring it, with the general statutory requirements of this state as to course and duration of preparatory and professional study, and also with the regulations of said state society and of the corporation conferring the diploma as to study, attendance, examination, and character, or if conferred by a school or college not recognized by said state society as reputable and providing an adequate course of instruction and maintaining a proper standard of attainment, character, and attendance; provided, also, that all persons lawfully licensed and registered at the time this act shall take effect shall be deemed lawfully licensed and registered hereunder, subject only to the provisions of section three of this act as to removal of practice.

SEC. 3. Every person practicing dentistry in this state shall register in the office of the clerk of the county where his place of business is located, and in the office of the clerk of any county into which he shall remove or in which he shall carry on his business, in a book to be prepared and kept by the clerk for that purpose, his name, age, office, and post-office address, legal authority for practicing dentistry in this state, and the date of such registration, which he shall be entitled to make only upon presenting to the county clerk a certificate from the member of the state board of censors appointed by the State Dental Society for the judicial district in which said county is situated, to the effect that said applicant for registration has received a proper diploma, as provided in section two of this act, and upon the making by said applicant of an affidavit stating his name, age, and legal authority to practice dentistry within this state. Every such certificate of a censor shall be filed by the county clerk receiving it, and every person admitted to registration under the provisions of this act shall be entitled, upon the payment of a fee of fifty cents to the county clerk, to receive from that official a certified transcript of his registration. All the affidavits made in pursuance of the provisions of this act shall be preserved in a bound volume by the county clerk in whose office they are made; provided, however, that all registrations lawfully made prior to the taking effect of this act shall continue to be as valid and of the same effect as when made; provided, also, that any registration procured by fraud or false statement of any kind shall be deemed null and void, and that the county clerk, upon the presentation to him of a certified copy of the judgment convicting any person of a violation of the provisions of the dental law, shall note the fact and date of such conviction upon the registration. If any affidavit made pursuant of the provisions of this act be willfully false in any material regard, the affiant shall be deemed guilty of perjury and punishable by imprisonment for not less than two nor more than ten years. Any person who shall sell or barter, or offer, either orally, in writing, or by printed advertisement, to sell or barter, or who shall by purchase, barter, fraud, false statements, bribe or promise of bribe, and without compliance with all provisions of law, any diploma purporting to confer a medical or dental degree, or any certificate, transcript, or registration provided to be given under this act or the statutes regulating the practice of medicine, or who shall substitute on any such diploma, certificate, or transcript for the name of the person to whom the same was given or granted the name of a different person, or shall fraudulently alter such diploma, certificate, transcript, or registration in any material regard, and any person who shall use or offer to use any such diploma, certificate, or transcript as a license or color of license or means of obtaining license or registration as a practitioner of medicine or dentistry, shall be guilty of a misdemeanor, and upon conviction thereof shall be punished by a fine of not less than five hundred dollars, or by imprisonment for not less than six months, or by both fine and imprisonment. Any person who, without a proper diploma conferring the same, shall assume the title of doctor of dental surgery or master of dental surgery, or shall append to his or her name the letters D.D.S., or the letters M.D.S., or any other letters specifically used by any medical or dental college, school board, or society to indicate that the person to whose name they are appended holds a recognized medical or dental degree, shall be deemed guilty of a misdemeanor, and upon conviction thereof shall be punished by a fine of not less than two hundred and fifty dollars, or by imprisonment for not less than three months, or by both fine and imprisonment. All fines and forfeitures of bail imposed and collected in consequence of violations of this act shall be paid to the Dental Society of the State of New York; provided, that if at the annual meetings of said society the treasurer shall report an excess of the sums so paid over the expenses of the society in enforcing this act, such excess shall be paid over by him to the treasurer of the state, and become part of the common-school fund; provided, also, that any such fine or forfeiture imposed in an action brought by an incorporated county medical society for violations of the provisions of this act relating to medical diplomas shall be paid to said prosecuting society.

SEC. 5. Sections eight, nine, and ten of chapter one hundred and fifty-two of the laws of eighteen hundred and sixty-eight shall read respectively as follows:

"SEC. 8. The State Dental Society organized as aforesaid having already at its first meeting appointed eight censors, one from each of the said district societies, to constitute a state board of censors, divided into four classes, to serve one, two, three, and four years respectively, shall at each annual meeting appoint two censors, to serve each four years and until their successors shall be chosen, and fill all vacancies that may have occurred in the board by death or otherwise. Each district society shall be entitled to one, and only one, member of said board of censors. Said board of censors shall meet at least once in each year, at such time and place as they shall designate, and, being thus met, they, or a majority of them, shall carefully and impartially examine all persons who are entitled to examination under the provisions of this act, and who shall present themselves for that purpose, and report their opinion in writing to said State Dental Society, and on the recommendation of the said board it shall be the duty of the president aforesaid to issue a diploma to such person or persons, signed by the president, the secretary, and said censors, and bearing the seal of said society, conferring upon him the degree of 'master of dental surgery' (M.D.S.), and it shall not be lawful for any other society, college, or corporation to grant to any person the said degree of 'master of dental surgery.'

"SEC. 9. The State Dental Society shall have the power to determine what medical and dental colleges maintain a course of education and training adequate in duration and standard to entitle their diplomas to be approved and certified by the censors as qualifying their holders to be licensed to practice dentistry in this state, and so registered. Said society shall admit to its examinations, provided for in section eight of this act, only the following classes of persons, upon satisfactory proof of good moral characters:

"First. All duly licensed and registered dentists of this state.

"Second. All persons coming from other states and countries who shall present to said society satisfactory proof of having been lawfully engaged in the practice of dentistry without the state for the term of six years.

"Third. All such persons as shall have studied dentistry for a term of four years in the office or offices of some reputable and duly licensed and registered dentist or dentists of this state, and shall have in other respects conformed to the regulations governing such examinations, which regulations not inconsistent with this act said society may make, and must publish at least twice in each calendar year in a leading dental journal. Every person actually engaged at the time this act takes effect in studying dentistry under private preceptorship as aforesaid, must within three months from the passage of this act file with the secretary of the State Dental Society a statement of his or her age, present address, commencement of terms of study, and the name and address of his or her preceptors, who shall also certify that said statement, so far as it relates to himself, is true. Any person beginning such a course of study after the act takes effect shall file a similar certificate, and until it shall be made the term of four years required by the statute shall not be deemed to be commenced No such student shall be eligible for examination for its diploma by said society who shall not have filed one of said certificates, all of which shall be preserved, bound, and indexed by said secretary. Any willfully false statement in any such certificates shall preclude the person making it from the privilege of examination. The censor for each judicial district of said state society shall be empowered to examine any applicant for the examination or certification of diploma granted under this act as to his or her age, identity, course of study, and if a diploma is offered for certification as to the time, place, and circumstance of its conferment. In so doing the censors are empowered to reduce the applicant's statements to the form of an affidavit, and administer the usual oath in respect thereto taken by affiants as to the truth of depositions in legal proceedings.

"Sec. 10. Every student, before filing the certificate called for by this act, shall pay to the secretary of the said state society a fee of five dollars. Every applicant for a censor's certificate that his or her diploma is approved by said society as entitling the holder to registration shall pay to the secretary of said society, at the time of his application, a fee of ten dollars. Every applicant for examination by the censors of said society shall pay to the said secretary, at the time of his application, a fee of thirty dollars. None of these fees shall be returned to the applicant, but shall be paid into the treasury of said society. But any applicant for examination before said censors who may have failed to obtain his diploma may for good cause shown be allowed thereafter to present himself for examination without payment of a further fee."

Sec. 6. Nothing in this act shall be construed to punish any person for performing merely mechanical work upon inert matter in a dental office or laboratory; or a registered student who for purposes of clinical instruction in the presence and under the immediate supervision of his preceptor may assist the latter in dental operation, providing that such student shall not under the pretense of so assisting a preceptor practice dentistry by performing operations independently; or a duly licensed and registered physician or surgeon for his lawful acts in the practice of his profession. Nothing in this act shall be construed to suspend or discontinue any prosecution already commenced under the laws in force prior to the taking effect of this act, and any violation of the provisions of this act forbidding the practice of dentistry without lawful authority, committed by a person who shall have been previously convicted under the laws of which this act is a codification, in any court within this state, of the misdemeanor of practicing dentistry without license or registration, shall be deemed a second offense within the meaning of this act; such laws being to that extent kept in force.

Sec. 7. The following acts are hereby repealed: Chapters three hundred and thirty-one of the laws of eighteen hundred and seventy, five hundred and forty of the laws of eighteen hundred and seventy-nine, three hundred and seventy-six of the laws of eighteen hundred and eighty-one, two hundred and eighty of the laws of eighteen hundred and eighty-eight, and three hundred and thirty-seven of the laws of eighteen hundred and eighty-nine.

Sec. 8. This act shall take effect immediately.

Information concerning the law may be obtained of Dr. William Carr, chairman of the committee on dental law, No. 35 West Forty-sixth street, New York city.

MISSISSIPPI DENTAL LAW.

Following is the text of the new dental law "regulating the practice of dentistry in the State of Mississippi." It passed both branches of the last legislature, and received the signature of the Governor on the 22d of April, 1892, to become a law on the 1st of November.

Section 1. Every person who desires to practice dentistry in the state of Mississippi must obtain a license to do so as hereinafter provided.

Sec. 2. A Board of Dental Examiners is hereby created, to consist of five practicing dentists, who shall be appointed by the Governor, and whose term of office shall expire with that of the Governor appointing them.

Sec 3. Each person appointed as a member of the Board of Dental Examiners shall qualify by taking the oath prescribed by the constitution for state officers, and shall file a certificate thereof in the office of the Secretary of State, within fifteen days after his appointment.

Sec. 4. After the members of the Board of Dental Examiners have qualified they shall meet at the capital of the state, in pursuance of a call to be made by the Governor, and organize by electing a president and secretary of the board from among themselves.

Sec. 5. Every person who desires to practice dentistry must apply, in writing, to the Board of Dental Examiners for license to do so; and, unless exempted by the provisions of this chapter, must appear before the board and be examined by it touching his learning and skill in dentistry, and if he be found to possess sufficient learning and skill therein, and to be of good moral character, the board shall immediately issue to him a license to practice dentistry, which shall be signed by each member of the board who attends the examination and approves the issuance of the license.

SEC. 6. The Board of Dental Examiners shall meet at the capital of the state on the first Tuesday in April of each year, for the purpose of examining applicants for license to practice dentistry; and it shall continue in session until all applicants for license have been examined, and their examinations have been approved or disapproved. All examinations, except as to character, shall be upon written questions and answers, and three members of the board are a quorum for business.

SEC. 7. Applicants for license, who are required to be examined touching their learning and skill in dentistry, must each pay a fee of ten dollars to the Board of Dental Examiners, as a condition precedent to examination, which fee shall be distributed among the members of the board as their compensation, in such proportion as the board may allow.

SEC. 8. Each person now engaged in the practice of dentistry in this state is entitled to receive a license therefor, without being examined touching his learning or skill in dentistry, if he shall apply therefor within six months after this law becomes operative, and shall pay twenty-five cents for its issuance. If such application be made within the time prescribed, and the twenty-five cents be paid, the secretary of the Board of Dental Examiners shall issue to the applicant a license to practice dentistry, which shall be signed in the name of the board by him as secretary.

SEC. 9. Any member of the Board of Dental Examiners may examine applicants, orally or in writing, and issue a temporary license to them to practice dentistry, which shall authorize such practice and be valid until the next succeeding meeting of the board. But one temporary license shall ever be issued to the same applicant.

SEC. 10. Every person who receives a license to practice dentistry must file it for record in the office of the clerk of the circuit court of the county in which he shall reside, within thirty days after its issuance; and if he fail to do so, he shall thereafter be liable for practicing dentistry without license so long as the same shall remain unrecorded. When such license shall be filed the clerk shall record the same in the book in which the licenses of physicians are recorded, upon the payment to him of the lawful fee, and when recorded the original shall be delivered on demand to the licensee.

SEC. 11. If a license to practice dentistry be issued and become lost or destroyed, the Board of Dental Examiners may issue another in lieu of it, upon satisfactory proof of the loss or destruction.

SEC. 12. It is the duty of the Board of Dental Examiners to cause its secretary to keep a complete record of its acts and proceedings, and to preserve all papers, documents, and correspondence received by the board and relating to its duties and office.

SEC. 13. Such stationery, blank books, and forms as may be needed by the Board of Dental Examiners, in the discharge of its duties, shall be furnished to it by the Board of Public Contracts.

SEC. 14. The Governor may remove any or all of the members of the Board of Dental Examiners, and appoint another or others in place of such as may be removed, and may fill by appointment any vacancy that may occur in the board.

SEC. 15. Physicians may extract teeth by virtue of their license to practice medicine.

OHIO DENTAL LAW.

WE print the following communication, taken from a Columbus, O., daily paper, containing important definitions of some of the provisions of the Ohio dental law:

Attorney-General Richards has made the following decision regarding the construction of the new law governing the practice of dentistry:

"The words, 'regularly since July 4, 1889, engaged in the practice of dentistry in this state,' mean steadily or continuously engaged in such practice, and the practice of dentistry does not include, I take it, a term of pupilage. There is a distinction between the study and the practice of dentistry, just as there is between the study and practice of law, or the study and practice of medicine. A person cannot be said to be engaged in the practice of dentistry who is simply a pupil, and is not qualified to do and does not do the work of a dentist on his own responsibility. The act itself (Section 6991) gives a good definition of what constitutes the practice of dentistry. A person who has been engaged in the practice of dentistry, as above indicated, since the 4th of July, 1889, whether of age when he began the practice or not, came within the class of those entitled to a certificate on making the necessary proof and paying the prescribed fee.

"A graduate of medicine must obtain the certificates of your board before engaging in the practice of dentistry. The exemption set out in Section 6991 applies to dental operations performed by legally qualified physicians and surgeons in connection with their practice of surgery and medicine. The act recognizes a distinction between such operations incidental to the practice of medicine and surgery, and the regular practice of dentistry requiring a certificate from your board.

"A physician who, in the practice of his profession, performed occasional dental operations, cannot be said to have been regularly engaged in the practice of dentistry, and hence is not entitled to a certificate to practice dentistry under the time exemption of the act.

"The provision of Section 6991, 'but nothing in this act shall be taken to apply to acts of *bona fide* students of dentistry, done in pursuits of clinical advantages, under the direct supervision of a preceptor, who is a licensed dentist in this state,' does not authorize such student to be sent out by his preceptor to perform dental operations beyond his direct and personal supervision. The purport of the law is to protect the public against the work of those unskilled in dentistry, by requiring proof of skill before power to practice dentistry is acquired. It permits, however, the performance of dental operations by students, so they may acquire the skill which in time, on the certificate of your board, will admit them to practice, provided the skill requisite for the protection of the patient is present in the person of the licensed dentist overseeing the work."

PERISCOPE.

Influence of Diet on Tooth-Structure.—I would suggest to you as a specific cause of the increase of dental caries a change that has taken place in a food-stuff of a particular kind and of primary importance—I mean bread, the staff of life, from which in the progress of civilization the coarse elements—and the coarse elements consist of the outer husks of the grains of which it is composed—have been eliminated. In as far as our own country at any rate is concerned, this is essentially an age of white bread and fine flour, and it is an age therefore in which we are no longer partaking to anything like the same amount that our ancestors did of the bran or husky parts of wheat, and so are deprived to a large degree of a chemical element which they contain—namely, fluorine. The late Dr. George Wilson showed that fluorine is more widely distributed in nature than was before his time supposed, but still, as he pointed out, it is but sparingly present where it does occur, and the only channels by which it can apparently find its way into the animal economy are through the siliceous stems of grasses and the outer husks of grain, in which it exists in comparative abundance. Analysis has proved that the enamel of the teeth contains more fluorine, in the form of fluoride of calcium, than any other part of the body, and fluorine might, indeed, be regarded as the characteristic chemical constituent of this structure, the hardest of all animal tissue and containing 95.5 per cent. of salts, against 72 per cent. in the dentine. As this is so, it is clear that a supply of fluorine, while the development of the teeth is proceeding, is essential to the proper formation of the enamel, and that any deficiency in this respect must result in thin and inferior enamel. If, in our dislike to grittiness, which has run parallel to our addiction to soft and succulent food, and in our preference for white and fine flour, we have cut off the main source of supply of fluorine to our systems, it is not difficult to understand how we may have thereby incurred comparatively feeble and unprotected teeth, with a diminished power of resistance to adverse influences, and peculiarly liable to decay. For the dense, close-fitting prisms of the enamel are to the tooth what its armor-plates are to a modern ship of war; and if they are easily penetrated, corroded, or worn away, then the fate of the dentine within is sealed. I think it well worthy of consideration whether the reintroduction into our diet, and especially into the diet of child-bearing women and of children, of a supply of fluorine in some suitable natural form—and what form can be more suitable than that in which it exists in the pellicles of our grain-stuffs?—might not do something to fortify the teeth of the next generation.—*Sir James Crichton-Browne, in The Lancet.*

Narcosis by the Aid of Pental.—M. Breuer has used pental in one hundred and twenty cases to obtain surgical insensibility. This is easily accomplished, and antalgia precedes the total disappearance of consciousness. Patients recover rapidly, in a minute, and experience no inconvenience on recovery.

He has administered pental to individuals of all ages. Children are put to sleep more rapidly than adults, women more quickly than men. Narcosis was prolonged in one case during thirty-one minutes, its duration varying with the quantity of pental employed, which ranged from ten to twenty grammes; in one case it was fifty grammes.

Experience is still insufficient to reach any conclusion with reference to the action of this anesthetic on respiration and circulation.

Among these one hundred and twenty cases was one case that threatened death. A young girl in good health was anesthetized for the extraction of a tooth. At the end of fifty seconds, after having respired four grammes of pental, she showed signs of collapse,—arrest of the pulse and respiration, extreme dilatation of the pupil, and disappearance of corneal reflexes. Artificial respiration practiced for some minutes resuscitated her.

It is probable that pental eliminates itself for the most part by the lungs; expired air has the odor of pental not only for some minutes but sometimes even for several hours after the administration.

If pental has the advantage of not producing any excitement, and of not being affected by light, it has the disadvantages of not inducing a complete muscular relaxation, of being inflamed easily, of high cost, and a disagreeable odor. M. Breuer advises to combine it with chloroform.—*Revue Odontologique.*

Accidents due to Cocaine.—Since the closing of the discussion on accidents due to the employment of cocaine, I have received a letter from Professor Germain Sée calling attention to the fact that he has published two articles on this subject. In these articles appear two lists,—one of ninety accidents, of which ten were mortal; another of one hundred and seventy, with eleven deaths.

Professor Germain Sée declares himself the foe of cocaine, which he considers a very unreliable and dangerous remedy.

I have also received from one of our army colleagues a statement of a very interesting case which he witnessed. One of his confrères freely practiced the injection of cocaine for the extraction of teeth, using a very concentrated solution, the fifth, and injecting three, four, or five drops. This was performed on a young soldier, and the tooth was extracted without pain. The soldier also requesting the extraction of an old root, an injection like the preceding was made, the extraction also painless; but at the moment of extraction the patient became uneasy, lost consciousness, was seized with clonic convulsions, the pulse hardly perceptible, the cornea insensible. For twenty minutes these effects continued to be serious, and the doctor feared he would lose his patient. Fortunately all passed off, and at the end of two hours no trace of them remained.

It is not for me to criticise here the propriety of the excessively concentrated solution, and the fact of the injections in the head, where it is impossible to practice hæmostasis and vascular compression, so well has this been observed by M. Schwartz.—*M. Berger, in La Revue Odontologique, April*, 1892.

Iodoform Poisoning.—Tuttle (*Boston Med. and Surg. Journal*, October 8, 1891) records the case of a woman who, twenty-four hours after using iodoform in her capacity of nurse, developed symptoms of poisoning by it. At first a very fine eruption of macules, papules, and vesicles came out on the face, neck, hands, and wrists; then followed a diffuse redness with œdema of the eyelids and backs of the hands; the conjunctivæ were intensely congested. The eruption appeared subsequently in all the parts exposed, but was most severe on the hands and between the fingers, where the vesicles became confluent, and, the epithelium having separated, a red oozing surface was left. On the fifth day there was some headache, itching was a prominent symptom, and desquamation took place on the backs of the hands. The course of the trouble was somewhat prolonged by the non-recognition of its nature, but the inflammation rapidly subsided when the exposure to iodoform was avoided.—*Brit. Med. Journ.*

HINTS AND QUERIES.

Dental Uses of Thymol.—In the *Deutsche Monatsschrift für Zahnheilkunde*, January and April issues for 1892, A. J. Hartmann calls attention to the value of thymol as a medicament in the treatment of acute pulpitis, claiming for it an antiseptic and germicidal action which is sufficient to arrest the inflammatory process resulting from microbic infection without exerting any escharotic effect upon the pulp-tissue. He cites cases of pulpitis with exposure successfully treated by thymol in substance, and recommends it as decidedly superior to carbolic acid as a preliminary treatment to the capping operation, which he asserts may be successfully performed after a sufficient treatment with thymol.

A limited series of experiments made with this drug fully substantiate the claims which Hartmann makes for it. The application may be made either by applying a small crystal or a powder of the pure drug directly to the pulp, and sealing it in under a suitable temporary stopping. A saturated solution of thymol in chloroform may be used on cotton, or the drug may be melted in a small capsule of metal or porcelain, and a pellet of cotton or small disk of blotting-paper dipped in the fluid thymol and applied. The drug possesses the peculiar property of remaining fluid long after its temperature has fallen below its fusing-point, which gives ample time to apply it to the pulp-exposure before solidification takes place. In every instance so far as tried, relief of pain instantly follows the application. In deep-seated caries with great sensitiveness of dentine where it is proposed to temporarily fill with gutta-percha, very satisfactory results have followed from touching the warmed and plastic gutta-percha to the surface of a thymol crystal, which slightly softens the surface of the gutta-percha by its solvent action, renders it adhesive as does chloroform or cajuput oil, and when inserted exerts an antiseptic and obtundent effect upon the dentine. Its use in this way suggests the possibility of its value as a component part of the gutta-percha temporary-stopping material in the preliminary treatment of cavities with sensitive dentine.—Edward C. Kirk.

To the Editor of the Dental Cosmos :

Sir,—About eight weeks ago an employé of the United States Rolling Stock Company met with a serious fracture of the lower maxilla by a large piece of timber being caught in the machinery and forcibly striking him upon the chin, knocking the anterior part of the alveolar process, containing the six anterior teeth, back in the posterior part of the mouth, and fracturing the body of the inferior maxilla in several places. There were two incised wounds upon the chin, being cut by the sharp edges of the timber. The case being one both difficult and interesting, I feel that the profession will be glad to know how it was treated. I first took the piece of alveolar border containing the six anterior teeth and carefully placed it in its natural position, and secured it by passing silver wire around the right bicuspids and then interlacing each of the displaced teeth, and securing them in position by uniting the ends of the silver wire around the bicuspids on the left. I then proceeded to drill holes through the fractured body of the bone. This finished, I passed wires through the drilled holes of the fractured parts. When these wires were made fast and tied, there was no crepitation whatsoever, the bone being perfectly solid and strong. I then stitched up the wounds upon the chin, and the operation was complete. In one week after the operation the patient had partial use of his jaw, and in three weeks could masticate ordinary food. Now he has complete use of his jaw, and sensation is present in each of the teeth that were entirely displaced by the blow.—D. S. Arnold, Anniston, Ala.

To the Editor of the Dental Cosmos :

Sir,—In my instructions for improvement in the adjustment of dental plates I should have been more explicit with regard to taking impressions. My experience teaches me that a perfect impression cannot be taken with plaster alone. The strain on the muscles draws the plaster away from the jaw around the border, and the softness of the plaster also prevents the pressing up of the soft parts of the palate. The first impression should always be taken in wax prepared with a mixture of beeswax and rosin. Press the outer edge up snug with the finger all round. Press up also on the back edge snug into the soft palate. Then let the wax cool well. Then put in sufficient plaster (a sprinkling of salt added) to spread over the whole impression when pressed to the mouth. When hardened, the impression is perfect. The surface of the wax impression may be softened over a lamp or in warm water, and then reinserted in the mouth and again pressed up if desired.—W. D. Holbrook, Watertown, N. Y.

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LIST OF UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING SEPTEMBER, 1892.

September 13.—No. 482,377, to J. W. Moffitt. Artificial tooth.
" " No. 482,520, to Field & Field. Portable chair.
" " No. 482,552, to W. G. Flanders. Tool sterilizer.
" " No. 482,553, to Melotte & Clinton. Bench-block.
" " No. 482,558, to L. Maillard. Dental drill.
" " No. 482,618, to A. J. F. Buxbaum. Rubber-dam clamp.
" " No. 482,631, to S. S. Fox. Tooth-brush case.
September 27.—No. 482,942, to D. Drawbaugh. Pneumatic tool.

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

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The abbreviations of titles used are those common to bibliographical work, and will, it is presumed, be readily comprehended by any one familiar with dental or scientific publications. Any explanation will be gladly furnished by the compiler. A star (*) indicates a Thesis.

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ORIGINAL COMMUNICATIONS.

A SHORT REVIEW OF DR. TALBOT'S WORK ENTITLED "A STUDY OF THE DEGENERACY OF THE JAWS OF THE HUMAN RACE."

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THIS work has been presented to the profession in a series of papers published by the DENTAL COSMOS from April to August, inclusive, 1892. The labor of its preparation must have been considerable, involving, as it did, some years of correspondence with many observers in various parts of the world, and much personal effort besides in the tabulation of statistics.

So far as this labor has been undertaken and carried forward for the simple purpose of obtaining the truth and increasing the store of scientific knowledge, the author is entitled to the grateful thanks of the profession. If there have been any errors of observation, or failures to exclude conditions likely to destroy in any wise the value of the statistics, they were undoubtedly oversights. If in the anxiety of the author to demonstrate a favorite theory he has gone too far in attempted deductions, and often seen fanciful relations not clear to the vision of others, he may be easily pardoned.

If the writer hereof shall take the liberty of reviewing some parts of the work in a manner that may seem to the author too severely critical, it will not be for the pleasure of argument or disagreement, but because he wishes nothing untrue or unproven to pass for truth without challenge.

THE TITLE.

It seems to me that in the very title of the work there is the indication of something wanting, in the purpose of labor undertaken ostensibly in the spirit of purely scientific inquiry.

The would-be scientist should not pursue a line of experiments for the purpose of proving that a thing *is* so, but he should be like an impartial judge in court, equally willing to give a verdict for or against, according to all the evidence.

The title of the work assumes that the proposition of degeneracy had been established ere the investigations were entered upon. It is simply "a study," as of the fall of the French monarchy or rise of the Dutch republic,—facts well known and universally acknowledged.

It is not a question, Has there been? Do the facts point that way? The author decides the question *by title*, before we have read a word of his argument.

PRELIMINARY STATEMENTS.

In reviewing any article these must be noticed, because they indicate the general principles which govern all that follows. If the base of the structure be unsound, everything built upon it is likely to be weak, ill-fitting, or disjointed.

The first paragraph of the article begins with the following words:

"In the scientific study of the evolution of the human race, man must be studied as an animal and the subject must be considered from two standpoints, because two structures are involved: first, the nervous system, and second, the osseous system. In the evolution of man great changes take place, and these changes are not unlike the modeling of a human being in clay. The sculptor, after he has fashioned his subject in a general way, adds small pieces of clay at one place and removes them from other places. Little by little these changes are made, until the clay begins to take on shapeliness and finally becomes a thing of beauty. So it is with the development of man. The orang and the chimpanzee represent the clay fashioned relatively less perfect. The changes which then take place in the development of man are as great, if not greater, than those which take place in the development of a clay model. . . .

"The continual development of the nervous system is accomplished at the expense of the osseous system."

"As an animal" only? "Two structures are involved." Only two structures involved in evolution? Man consists simply of a "nervous" and an "osseous" system, differing from the orang and chimpanzee, from which he has been made, only in proportions and relations of nervous tissue and bone. An unseen sculptor once undertook to make a man from a chimpanzee by taking off a little clay here and adding it there. Unlike the sculptor, however, he never knows when he has got through and never quits.

Why may we not study man scientifically in this connection from every standpoint instead of two only? Why not study him in all his relations as man? Is the development of the nervous system accomplished at the expense of the osseous? Is this true as a matter of history or present observation? Was not the intellectual age of Greece the time of her greatest physical development and prowess? Is she not weaker now from *every* standpoint? Is not her degeneracy symmetrical? With the decline of Rome did not mental and physical degeneracy go hand in hand? The nervous system, it must not be forgotten, includes the brain. Where is there an example of any people growing in cerebral power while undergoing any sort of physical degeneracy?

Is not the weight of bone and muscle (*all* the bones) in the average Englishman of to-day as great, yea greater, than it was one, two, or three hundred years ago? There is every ground for believing it, from all conditions and facts known. The civilized man of to-day is better fed, more regularly fed and clothed,—better cared for every way. In making up our averages we must allow for the fact that by reason of hard conditions many more in former days died early, for only the strong could survive. Have the standards of weight and strength of the French, German, or American armies been lowered by the increase of intelligence?

Why are we at the outset expected to accept such propositions? Is it simply in order that a man may be made out of a chimpanzee or an orang, by the simple process of subtracting clay from his jaws and thinning out his cranium?

Again, "Our food is now prepared in such a manner that mastication is almost unnecessary, and arrest of development in the jaws and decay of the teeth must follow as a result."

Is this true as a general proposition? One might infer that the human race was living exclusively on mashed potatoes and mush. As a matter of fact, well established by agricultural and trade statistics, the consumption of meat by civilized man is more general than ever before, and constantly increasing. There has never been a time in the history of the world when so much tough steak, rare roast beef, and three-year-old spring chicken were consumed as now, and, thanks to dentistry, never a time for a thousand years when men had so many good teeth to assist their stomachs.

Since reading the first of Dr. Talbot's papers I have taken pains to observe some thousands of persons in restaurants and hotels, in different parts of the United States, when, unconscious of special observation, they were acting with the simple *abandon* of their hungry natures. I have noticed that the great majority had well-formed, strong jaws, as compared with and corresponding to their other osseous tissues, and, if mastication were "*quite unnecessary*," they were guilty of a tremendous waste of energy. I have observed a general demand and preference for the "heel" of the loaf, for "rare" and "medium" beef, and green corn in the ear. The only man I know who habitually orders soft food, is one who has lost his lower jaw by an operation for cancer. *He* has a true degeneracy of the jaw. Good average cooking, such as we are having more and more in city and country, among business people, artisans, and farmers, promotes digestion, assimilation, and growth, and makes many otherwise useless articles valuable for food. Good cookery is economical, harmless, and conservative. We are not to judge a nation by a class, nor the world by one race, nor all time by a decade, nor to make rules out of exceptions. The world as a whole is marching on, applying its intelligence to all things, and holding its own,—jaws and all.

"The tendency of the race is to develop in an intellectual line; but if the race seeks a high education and brain-development without a corresponding physical training, the result is a fully developed cerebrum and a weak physical structure."

Of course a weak physical structure,—lungs, livers, femurs, scapulæ, and maxillæ. But who is doing it? Certainly there has never been a time when this was better understood by educators; and the drift of plan and purpose is all in the direction of physical *with* mental training. Look at the gymnasia springing into existence everywhere, with swimming-schools and all sorts of athletic sports for the young men and maidens. These privileges are enjoyed even by those who do physical labor, but more especially by that other unfortunate class who are not compelled to work. Think how much the bicycle alone is doing for the development of the human jaw!

But now, behold! Notwithstanding that nobody chews anything any more, or needs to, "and failure of development of the jaws and decay of the teeth must result," still, comparing ourselves with our ancestors, "there can be no doubt that the human race is improving in grace, beauty, and intellect." *Blessed be calamity,—Great is degeneracy!*

As an illustration of how this may be accomplished, not by the long-struggling artist of a million years, but in a single century, by rapid degeneracy, the reader is referred to the cuts on page 255 (April number) of the DENTAL COSMOS. They are four in number, and represent as many generations of men, from the great-grandfather to the great-grandson; and they are presented seriously as evidence of this newly discovered evolution of "grace and beauty."

Now, if this be evidence, it ought to be capable of indefinite multiplication, by the examination of thousands of photographs, and by personal inspection of people, many of whom are living to represent four generations. But is it evidence? Who doubts that the exact reverse could be as easily found,—viz, a strong-jawed man of the present day with a thin-faced great-grandfather?

The author takes no account of the possible fact that the features of No. 1 may have been modified by some special heredity or accident of dentition; or that the early and frequent application of his mouth, while the bones were yet soft, to an old-fashioned Connecticut cider-jug might have produced a facial protrusion. It is a well-known fact that in those days they all had the jug, and many had the protrusion.

Neither is account taken of the certain fact that three of these men had wives, and all had mothers. If we are to "study man as an animal," it is well to remember that by all experts dams are considered of equal importance with sires. Each female in this series had a heredity,—from two parents, four grandparents, eight great-grandparents, sixteen great-great-grandparents, and so on,—and each ancestor was represented in the crossing of the lines.

Heredity is a vast net-work. Into each life a thousand streams have converged by the simple plan of a double parentage; then *from* each reproductive life the stream flows on, to *diverge* into ever-multiplying channels again.

It is not well to jump at conclusions in a field like this. Banana-peels are waiting for the feet of the jumper.

I cannot forbear some quotations which, as it seems to me, show a tendency to loose statement and classification, also a redundancy of adjectives inconsistent with careful. accurate reasoning; to show which I shall put certain words in italics:

(Quotation, p. 256.) . . . "Children of neurotic parents are apt to inherit brilliant minds and *very* weak constitutions. They are *very* bright scholars, *always* standing at the heads of their classes. Such children are *very* susceptible to disease, and it not infrequently happens that, when disease comes, death is the result." (Yes, we would think so.) "*If they grow up, they frequently become geniuses or insane, drunkards, criminals, or egotists.*" Shades of Michael Angelo, Shakespeare, Dickens, and Great Scott!

"Miss H., thirteen years of age, of *very* slight build, bones *very* small for her age, is of a *very* nervous temperament; cries *without the slightest provocation*, is *constantly* doing things that she ought not to do, for which she is *continually* being punished by her parents." . . . "*All the teeth were completely covered* with tartar," etc.

This is a remarkable case; but there has never been a time since civilization dawned when such a combination of circumstances as have afflicted this child would not have produced similar results.

"Dr. Hammond has made the remark that the coming man will be hairless and toothless. But it is apparent to every one that the people of the present day are not only losing their hair more rapidly, but the teeth also are subject to an earlier decay and degeneracy, and the eyesight and hearing are deteriorating." (P. 257.)

Well! well! it is evident the "calamity howler" is not confined exclusively to the political field. The scientific world has been invaded, and to the general poverty of mankind there are to be added progressive blindness, deafness, toothlessness, and jawlessness. Yet we take comfort in the previous statement of the author, that "there is no doubt the human race is growing in grace"—(this will comfort the theologian also),—"grace, beauty, and intellect."

May we ask a few questions of these gentlemen?

Do the children of bald-headed men show any lack of hair? Are more wigs worn by women now than in the days of good Queen Bess?

How long have wig-makers been in business in the world? A few decades and centuries ago nearly every man wore a wig, but wigs are not just now the fashion.

No one probably will question the truth of Darwin's statement, quoted by the author, that "increased action strengthens muscles," and that, "on the other hand, disuse weakens them," or that the tendency of unused organs is to become rudimentary. We would willingly let the whole question hang upon this pivot, believing fully that if there is any one thing in this world being overworked, it is the human jaw.

Now right here I have Dr. Talbot on the hip; because on page 260 he says of the "individual who speaks or sings much," that his "jaws are square, thick-set; the structure is dense and hard." It follows that the jaws of a very large proportion of the race must be exceedingly "dense and hard." It will soon be necessary to bring in degeneracy of the vocal organs as an auxiliary in this connection, to insure smooth sailing.

Classed with the speaker and the singer as possessing jaws "*square, thick-set*," with "*structure dense and hard*," we have the tobacco-chewer. It is true, therefore, that all who use their jaws much—speakers, talkers, vendors, boys, girls, auctioneers, mule- and ox-drivers, bosses, clerks who call "cash," newsboys, and scolds, with singers and tobacco-chewers—are doing their best against the degenerative tendency.

On the other hand, the class represented by the young girl described on page 260 are doing their full share for the hopeful evolution of "grace, beauty, and intellect." This girl "has been reared in a hotel in a large city, has slender and delicate jaws, teeth small, of a bluish color, badly decayed." She "lives upon liquid food, pie, cake, very little meat, has no appetite, takes no exercise" (poor thing !), "is out late nights, sleeps daytimes, is ill most of the time and has no color," and she probably isn't very well. She should be placed in matrimonial quarantine.

THE STATISTICS.

Dr. Talbot presents us with tables of statistics covering ten pages, of which he says,—

"In securing this large collection of measurements of crania and living individuals, the compilation of which has extended over a period of eight years, I have endeavored to show by actual demonstration that the jaw of the human race is diminishing in size."

An array of figures covering ten pages is always imposing, and one is often tempted to take for granted an author's conclusions rather than the time for a careful examination of them. I have resisted such temptation, however, in this instance, and to my mind they come very far short of demonstrating what he claims ; especially in view of the fact that certain possibilities of error have been by him apparently overlooked.

First, it seems to me that his directions to his correspondents, for measurements, unless more definite than given in his article, were liable to be not uniformly understood. "From the outer surface of one first molar to the outer surface of the corresponding molar of the other side," is not sufficiently explicit. He does not say whether it shall be at the farthest outward projection of the tooth, which might be at the gingival margin or elsewhere, in different mouths ; or at the base of the posterior cusps, or in the sulci between the cusps. The illustration would indicate the last named. "Outer surface" is indefinite.

If the teeth of ancient skulls were measured from the point of surface farthest projecting, and measurements of distances "in living persons" made from one of the other points mentioned, the variations were fatal to accurate comparison.

Second, the teeth in crania are always loose and more or less movable in their sockets ; sometimes also projecting, and held so by deposits of dirt about the roots. Unless these facts were recognized and carefully allowed for, slight variations would occur. The original distances in the ancient subject would not be accurately represented by the measurements of his skull, made three thousand years later.

Third, it is not stated that examinations either of crania or living people were confined to those having *full mouths*. That such precaution was not taken is evident from the fact that one of his illustrations shows the measurement of a mouth being taken (page 356), where a bicuspid has been lost and the molar visibly displaced.

This is a matter of extreme importance in this connection, because only in the living persons and very recent skulls would there be conditions modified by the extraction of teeth. The ancients, and even modern peoples not far off, have been strangers to the wicked forceps, which has in these days removed so many deciduous molars and bicuspids, causing a displacement forward of the first molars and a narrowing of the arch. Both dentists and country doctors have done something in this line to modify diameters.

Fourth, it is not stated that modern mouths having *irregularities* were excluded, as they should have been for similar reasons as above,

—viz, that they are so often dependent on the mechanical interference of the forceps with deciduous teeth.

Fifth, the skulls of ancient adults, as found, may be reasonably supposed to represent fairly the average of the people to whom they belonged. On the other hand, it may be doubted whether the patients presenting in private practice, together with others who were "dispensary patients and from the middle and poorer classes," do fairly represent the average of all the people in our modern communities. Quite a large proportion of the strong-boned people who are doing the hard work of our world are seldom seen either in the dental offices of leading practitioners, or in infirmaries. The variations in the tables on this account may be very slight indeed, but we must remember that the margins claimed in the final comparisons are also small.

Sixth, probably many readers, glancing over these tables in the ordinary manner, would fail to notice an important, and what seems to me a very strange, omission. It is something I cannot understand, that Dr. Talbot should have devoted three pages to the antero-posterior diameters, and one to the height of vault of crania, and given us absolutely nothing of these measurements upon persons of the present day. Certainly it cannot be claimed of these four pages that they prove anything, for they are compared with nothing. Yet such comparisons must have been originally intended, else why were antero-posterior or vault measurements made at all?

The lateral measurements are not so treated; those of crania being set off against a page of lateral measurements of "living persons." It cannot be said that the other measurements could not be conveniently made, for the diagram of the instrument used shows they were easily practicable. We can hardly doubt that they have been made, many of them. Why are they not given? Why are we led to expect them, and then disappointed and the whole matter ignored? The author goes on at length (pages 349 to 351) attempting to show the deterioration of the jaw by comparisons of ancient and modern *lateral* diameters, but when he speaks of the antero-posterior and vault measurements he branches off on unimportant lines and ignores the *main* question. Is it possible that the measurements were unsatisfactory,—"did not pan out," so to speak, for the theory?

But, as the author has seen fit to confine himself exclusively to his "lateral" statistics, we will take a glance at them, and see what they really amount to, standing alone.

Of Crania.

The first class given consists of 342 "Europeans, ancient and modern, Romans, Italians, French, English." This, of course, is valueless for evidence. If we are trying to learn something by comparing ancient *with* modern skulls, our light is not increased by lumping them all together.

	Mm.
The average measurement of the omnibus, however, is given as	58.84
Ancient.	
378 Ancient Peruvians, average	57.71
72 Ancient Californians, "	57.99
187 Stone Grave People (about)	59.75
59 Crania from Caves, Mexico and United States.	55.56 to 58.45
56 Ancient Egyptians (about)	56 80

This covers, I think, all the measurements of undeniably ancient skulls,—all that are of special value to this discussion.

It will be observed, first, that the averages are slightly below those of the "Europeans, ancient and modern," presumably largely modern, gathered from battle-fields, colleges, and hospitals.

We will now compare the "ancient" measurements with those of "living persons" (p. 348).

If we are to judge the small number of measurements (twenty-nine) of the Greeks, their jaws may have degenerated with all their other bones since Greece ruled the world.

			Mm.
The average is			49.50
887 Swedes and Danes,	54.06 to 57.37 ;	average, male and female,	55.71
306 Belgians,	55.57 to 57.05 ;	" " "	55.31
300 Polanders,	55.16 to 58.84 ;	" " "	56.50
390 Englishmen,	55.56 to 57.37 ;	" " "	56.47
212 Irish, Dublin,	53.58 to 57.13 ;	" " "	55.85
102 Chicagoans,	54.33 to 56.34 ;	" " "	55.34
102 Illinois and Chicago, about		" " "	53 00

Before saying anything about the figures above given, we will turn to the table of measurements made by Dr. Mummery, of England, on page 347. This page, as it seems to me. presents more reliable data than all the other (eight) pages combined, because

First, they are comparisons of *skulls with skulls*, *ancient with modern*.

Second, the measurements were made by one man, who could have no misunderstanding with himself as to the points from which they should be made.

Third, the well-known character of Dr. Mummery is a guarantee that nothing was done in a hasty or careless manner.

Fourth, the tables represent a large aggregate of systematic classification.

The first thing that strikes the reader on a close inspection is the very marked difference between the figures of the other tables and those of Dr. Mummery.

His figures are more nearly uniform, not so variable in averages. Altogether they are about fifteen per cent. larger for measurements of the same classes. For example :

	Mm.
Dr. Mummery's 69 Esquimaux (modern skulls) give an average measurement of	65.08
Dr. Talbot's 42 Esquimaux	57.30
Dr. Mummery's 132 Australians	65.09
Dr. Talbot's 10 Australians	58.84
Dr. Mummery's 236 Africans	63.49
Dr. Talbot's 79 Africans	57.58
Dr. Mummery's 125 North American Indians	64.29
Dr. Talbot's 219 North American Indians	54.79
Dr. Mummery's 36 Ancient Egyptians	60.33
Dr. Talbot's 27 Ancient Egyptians	52.29

These discrepancies are plainly inconsistent with any uniform system of measurement.

If Dr. Mummery took his directions from Dr. Talbot, which is not probable, he did not understand them. If Dr. Talbot has attempted to follow Dr. Mummery, which *is* probable, he did not measure from the same points. But Dr. Talbot gives us no intimation of this in his comments. The whole mass is presented as parts of a systematic series of investigations. Yet, notwithstanding, a casual glance will show that Dr. Mummery's *minimums* are considerably greater than Dr. Talbot's *averages*, referring to the same classes of skulls.

As Dr. Mummery's tables, shown in connection with the others, are absolutely inconsistent with them, and, so far as they may be supposed to prove anything for or against "degeneracy of the jaws," are positively against the theory, it is difficult to understand why they should have been used at all. We are informed in a foot-note that they "were made about 1860; being the first made, only maximum and minimum figures were given, instead of presenting them entire in a table, which would have been more scientific." Nevertheless, the average must have been somewhere about halfway between the maximum and minimum figures, and near enough for a practical estimate; yet, as we have said, the minimum figures exceed the averages of the later tables. A detailed statement could not have materially changed the result one way or another.

Dr. Mummery's is a condensed table, showing on one page the results of the examination of 1708 skulls—1250 modern, 458 ancient—for lateral measurements, and these are classified so that a definite comparison may be made. Dr. Talbot, on the other hand, gives no such classification. Of the majority of the skulls enumerated by him the probable age is not given, and if the reader will take the trouble to look along the lines, he will see that the figures run about alike for all,—ancient, mixed, modern, and uncertain.

Dr. Talbot hangs his whole case on the comparison of this heterogeneous lot of skulls with mouths of living people, but without provision for all necessary conditions to insure accuracy.

But suppose these had all been observed, so far as measurements were concerned, even then would such a comparison be fairly conclusive of the theory in dispute? To show degeneracy of the jaws, noses, or toes of any people it would be essential to compare them with the same organs of their *own ancestors*. It would be necessary to compare ancient Egyptians with *modern* Egyptians, Australians with Australians, Chinese with Chinese, Saxon with Saxon, Celt with Celt,—pure and unmixed, as far as possible. The people of England, Sweden, Poland, and the United States, who principally have had their mouths measured for these tables, are not descendants of ancient Peruvians, Californians, Mound-Builders, Negroes, Flatheads, Esquimaux, with here and there a Zulu, Aleutian Islander, or Mauritian dwarf thrown in.

To make accurate comparisons of any of the bones of the people of the United States with those of their remote ancestors would not be an easy task. We are a mixed people, descended from the various races of Europe. The bones of all those races would have to be sought out, and of undeniable antiquity, accurate measurements made and an approximate average arrived at, before we could come at even probable, not to say positive, conclusions. It would be a long time before we could safely entitle an article as follows: "*A Study of the Degeneracy of the Tarsal Phalanges of the Human Race*," and demonstrate the same by a few thousand measurements of ancient bones and those of living persons.

There are other questions connected with these tables which, as it seems to me, are slightly confusing. For example, of omission, we have *no* measurements of the jaws of the sturdy German people, except Belgians, nor of the French, nor Hollanders,—peoples who do use their jaws, and "speak and sing much."

We do have tables given of the Swedes, whose lateral diameters in their own country measure :

		Mm.
	Males,	57.37
	Females,	54.60
Danes	Males,	56 82
	Females,	55.72
Poles	Males,	58.84
	Females,	55.16

The jaws of these highly civilized races measure about the same as those of "Europeans, *ancient and modern*" (first table).

English, London (almost 58)	Males,	57.92
	Females,	53.19
Irish, Dublin	Males,	57.13
	Females,	53.19

These figures range closely with those of "Ancient Peruvians," "Mound-Builders," "Stone Grave Builders," etc., notwithstanding the disadvantage (as I deem it) given the former class in the taking of measurements. But these same Swedes, Danes, Poles, English, Irish, and Germans, with their children, form a large majority of the population of Chicago. Why should they measure so much less here than in their own country?

It is also puzzling to note that in London the jaws of men are nearly four per cent. larger than those of women, while in the World's Fair city they lack only the half of one per cent. But our confusion is increased by noting that the jaws of the women of Chicago *and Illinois* have degenerated below those of Chicago proper, by 2.46 mm., or quite two and one-half per cent. As a resident of Chicago, having had much pride in our ladies, this discovery grieves me. I am loath to admit that these tables seem to prove that their speech is not so gentle or infrequent as it should be, and that they are not keeping pace with their sisters of the state in the evolution toward "grace, beauty, and intellect."

In Boston, of course, we naturally expect jaw-degeneracy in proportion to culture, and we are not disappointed. She comes to the fore with 896 cases, gender not given, but presumably male and female nearly equal. The result is highly encouraging,—an average of only 51.80 mm. as against the crude New Yorkers, whose male jaws measure 55.72, females 53.76 !

It is again confusing to note the measurements of jaws in Burlington, Vt., as compared with Boston and Chicago. We would suppose, naturally, that Burlington, being so near Boston, would not differ materially therefrom in evidences of refinement ; but in this we are mistaken. The jaws of fifty-two men of Burlington measure 55.56, against Boston's common-gender 51.80. Fifty Burlington females, however, show lateral jaw measurements of 51.31. But why should there be a difference of 4.25 between male and female jaws in Burlington, and only 00.50 in Chicago? The Burlingtonites would seem to be more closely related to the Marshpee Indians, with an average of 54.70,—males, 56.90, females, 52.50; difference between males and females, 4.40. This would indicate that the relative conditions of the sexes are about the same in the two communities.

Now, I hope no one will accuse me of attempting to make sport of these figures. I simply hold them up to view, and if they display incongruities I cannot help it. To my mind they exhibit so many discrepancies, that were I a believer in the theory they are brought forth to prove, they would possess no value whatever in evidence. It is an axiom of statistics that where figures are inconsistent with themselves they stand condemned without further disproof.

Dr. Talbot says (p. 349) that "a careful study of the statistics will show that the diameter of the jaws depends to a great extent upon the size of the skeleton; thus a small person will possess a small jaw, a large person a large jaw." Why, of course! Also: "We notice that there is as marked a difference between the size of the jaws of the male and female as there is in the size of their skeletons." Certainly! This is the truth. Then instead of trying to prove the degeneracy of a single human bone, why not "go for" the whole osseous system? That is the proper thing to do, if one wishes to do anything in this direction. If we are degenerating, let us degenerate symmetrically, neatly, decently and in order.

But he says this rule "is not invariable." Outside of a few laws in mathematics, I am not aware that we have many that are invariable. In fact, exceptions are said only to "prove the rule." We never base our theories on exceptions if we expect to prove them.

But the title of this paper contains a promise of brevity, and I cannot pursue my review much further if the promise is to be kept.

The remainder of Dr. Talbot's paper following the statistics is largely made up of quotations from the writings of Spencer, Darwin, Galton, and others, which seem to him to be in support of his theory of jaw-degeneracy. Of course these make interesting reading, as the authors quoted have not often written things not interesting. But I cannot see that they may be reasonably drawn upon to prove degeneracy of the maxillary bones more than of any other bone or part of the body, which one might suppose to be retrograding.

The gist of all that follows is to show that organs or members disused grow smaller and will run out. It is simply, then, a matter of use. Now, it seems to me that one of the last things man can afford to dispense with as long as he does business on this planet is his jaw.

However, it does my heart good to heartily commend, for the most part, one portion of Dr. Talbot's paper, "*Extraction of the Permanent Teeth*" (pages 521–2–3), only I wish he had included the temporary teeth as well. The first sentence reads: "To my mind there is no one cause that has produced such a baneful influence upon the jaws of the present generation as that of dentistry." This refers to dentistry not as it is now practiced by the best class of dentists, but the popular so-called dentistry of the past. But this sort of dentistry is fast dying out. It is a transient condition in human experience. Its effects will, therefore, not be permanent but temporary, while it may undoubtedly have modified the measurements shown in Dr. Talbot's tables, as I have stated in my criticism of his statistics.

Now, just one thing more. One of Dr. Talbot's closing remarks is that "owing to the neurotic condition into which we are fast drifting, arrest of and excessive development of the jaws are becoming more common"—(so it works both ways), and "the teeth are the same size to-day they were three thousand years ago." "They do not diminish in size in proportion to the jaws, hence irregularities of the teeth will become more numerous."

Let us examine this proposition.

The alveolar process is built up, and exists solely for the accommodation of the teeth. The process, therefore, must correspond to the teeth, and be of "*the same size*" as heretofore. It stands to reason, also, that the foundation of the process, the maxillary bone, would correspond to the structure to be built upon it. Nature is not in the habit of making things top-heavy. She does not build her pyramids apex downward.

The doctor forgot right here to allow for bad "dentistry" and its "baneful influence upon the jaws of the present generation," of which he had spoken before.

It is *extraction of the temporary teeth, particularly of molars and cuspids*, which produces the greater number of irregularities, and they will continue to be frequent so long as Tom, Dick, and Harry continue such malpractice.

I wish to say, in conclusion, that while I disagree with Dr. Talbot in many things, I hold him entitled to much praise for industry and perseverance in following out whatever he has taken in hand.

FANCIES AND SOME FACTS.

BY CHAS. B. ATKINSON, D.D.S., NEW YORK, N. Y.

(Read before the First District Dental Society of the State of New York, October 11, 1892.)

Mr. President and Gentlemen,—Enthusiasm should underlie all literary effort, and more especially when devoted to professional subjects. The value of any presentment lies in some practical worth imparted, some suggested investigation, some proposed reform in methods or in our relations with one another.

In dental literature so much has been offered on all of these lines that little seems to be demanded. Our literature shows an amount of original thought that is encouraging and stimulating. In mechanics, as applied in efforts at repair and in the substitution of lost elements of the oral constitution, a range of means has been presented that permits a wonderful degree of restoration. Therefore, with intelligent discrimination, the reparative and substitutive power, the general possession of anatomical and pathological information and comprehension of therapy, the condition is bad indeed that may not be restored to health, service, and beauty.

The writer feels that each should contribute something when he can. Scientific investigators are increasing among us, and those of us who pay attention solely to practice, and only come to society meetings to hear and not to speak, do not fairly reciprocate the labors of these more enthusiastic members. Trials come to all of us, and the ways that others have found to overcome difficulties help us in our turn.

Each practice is dependent upon and takes character from the personality of the operator. One may control his practice or be controlled by it, mainly as he himself possesses or lacks individuality. Character of personality largely governs need for obtundents. Here comes in a consideration of shock, so ably considered by Dr. J. S. Marshall recently. Patience and time, sharp burs at high speed in a steady hand, which rapidly changes the point of contact, meet most of the calls for obtundents. Some days since a professional brother stated to me that all that could be asked for the operation commonly designated "cleaning teeth" was a fee of two dollars, and from conversation with many other dentists such fee seems to be usual. The answer was made that if one had the courage to ask a good fee, that of itself was a first necessary step to receiving it. The writer feels that justice to an average mouth in removing the several deposits that will accumulate about the teeth can seldom be done in one hour, and three hours of faithful work for this operation are frequently required.

An average appointment for scaling and polishing is two hours. A fancy is that too great effort is made to hasten operations, the tendency being toward inefficiency. Is it fancy that chronic small fees result in slack treatment or its abandonment?

Experience suggests that few dentists charge for treatment in connection with filling. Many circumstances affect the care of cases which no one may know except the operator in charge of the work, and it is suggested that a question of a visit fee may urge immediate mutilation when the scheme of charges of the dentist in question does not embrace treatment as a valuable service for which a fee would be asked. In the care of children a visit fee will serve a very good purpose in determining a proper charge for much of the work on temporary teeth.

Medicine and dentistry are drifting too fast into specialties. In both professions harm is being done by special operations being performed unwarrantably. The general advancement from the educational standpoint that specialism brings to us is of very great advantage from circumscribing individual efforts, thereby intensifying observation of detail that a more general outlook might not observe. However, when it comes to *practicing* a specialty, this very particular observation illumines the special organs, and general relations are, to an extent, disregarded, and it is believed mutilation is many times endured at the hands of the specialist. In dentistry, specialists in bridge-work have mutilated serviceable teeth, as have makers of plates removed many equally useful ones. But the evidence is too plain to specify; it is considered sufficient to state the fact.

The following statements of what is new to the writer are presented as the excuse for appearing before you this evening. It is hoped that some value may be found in the clinical suggestions, even though the special preparations may prove to be well known, as has frequently resulted on the presentation of supposed new propositions in the past.

Through the courtesy of Messrs. McKesson & Robbins, I am able to offer a few specimens of some preparations of oxygen in solution, and would request that they be submitted to a committee of three of your members for experiment and investigation, that a series of observations may be secured in a regulated, organized manner, wherefrom an adequate judgment of the merits of these preparations may be formed. In order to determine the extent and character of change, if any, which these preparations produce on human teeth, a sample of each strength was bottled, together with several teeth, corked and sealed. These exhibits are offered for the consideration of the committee. The bleaching of these specimens was almost immediate, but continued slowly over several days. Specimens of teeth not treated with the pyrozone are presented, to compare in color with those that have been treated.

The following apparent results are offered rather as suggestions based upon clinical use of these preparations, than as clinical *facts*.

The medicinal pyrozone is an aqueous solution containing three per cent. H_2O_2, which represents fifteen volumes of contained gas.

The former so-called fifteen-volume solutions are now claimed to be but ten volumes.

The range of use for this three per cent. pyrozone is similar to that in which the ordinary peroxide has been employed.

In this connection, I would like to say that diluted peroxide is often prescribed, and that I have never used it with any satisfaction when diluted, but always use it full strength.

Medicinal pyrozone is a good bleacher, but less penetrating in its effects than the stronger preparations.

The antiseptic pyrozone, containing five per cent. H_2O_2, or twenty-five volumes in ethereal solution, seems to be more generally serviceable in dentistry. The caution should be noted that concentration follows upon evaporation of the ether. Thereby the antiseptic strength in time may become caustic. The effects of the five per cent. and of the twenty-five per cent. or caustic solution are so similar in general character, that with the statement that the twenty-five per cent. in most instances *is* caustic, though not in all, an indefinite description as between the two will serve as an outline of the observations that have been had on these oxygen-conveyors.

These ethereal preparations are neutral, and, although they decolorize litmus paper, it is by bleaching through the action of the oxygen on the organic coloring matter, not a reaction due to acid.

They are inflammable and volatile. The first use made of them by the writer was in the bleaching of teeth. A pledget of cotton soaked with pyrozone five per cent. was placed in a cavity, and the surface of the tooth wiped with the same strength. It produced a very considerable bleaching effect in a pulpless right superior first bicuspid. This five per cent. strength has been used to remove the brown or green stain about the necks of children's teeth, care being exercised that the fluid does not touch the gum.

As a bleacher, pyrozone is (by its makers) advised to be used after applying an alkali.

Pyrozone alone bleaches teeth well. Whether it is a solvent of the organic substance of the tooth, or whether the chemical constitution of the tooth, being mainly alkaline, furnishes the basis for its activity, remains to be shown. Its application on soft tissue produces a bleaching effect strongly resembling an eschar. This progresses slowly after application, therefore caution should be exercised to give full time for this characteristic appearance before further application. The white, apparently coagulated surface resumes a pink tone slightly lighter than before the application of the pyrozone.

The change occupies from one-quarter to one minute in whitening the surface, according to the character of the inflammation. The more the inflammation approaches suppuration, or the greater the congestion, the more rapid is the action of apparent coagulation. The fading of the white color occupies five to ten minutes.

Pyrozone in all strengths is a prompt hæmostatic, although because of the caustic effect sometimes produced by both the stronger ethereal solutions, the three per cent. will probably best serve this office. Pyrozone acts more promptly on moist surfaces than on such as are dry. In a case of pyorrhea alveolaris, suppurating for eight months previous to presenting for treatment, involving the superior six front teeth from cuspid to cuspid, bicuspids absent, molars *in situ* but unaffected, and the inferior teeth from the right second bicuspid to the left first bicuspid, root of the left inferior second bicuspid *in situ*, crown fractured, the suppuration was controlled after one application of caustic pyrozone (twenty-five per cent.) on all of the teeth except about the transverse processes between the right superior central and lateral, and the left inferior central and lateral. The processes themselves had softened; and will require further time to become restored to health. In this instance the caustic pyrozone caused a surface coagulation under which, or through which rather, the gas seemed to be liberated continuously, producing a crepitous sensation on passing the finger over the surface. This crepitation gradually subsided, the confined gas seemingly being given off through the external coagulated surface.

The color (white) fades more rapidly from the normal surface than from the abnormal, and as a diagnostic help pyrozone five per cent. seems to have possibilities. Liquid alboline, benzoinol, or other *mineral-oil* product, as vaseline, will be found palliative to the prickling of the caustic.

It was intended to make some observations upon phenate of cocaine, but the clinical opportunities sought for pyrozone have somewhat eclipsed the phenate. However, for the present it must suffice to state tersely that as a local anesthetic for extraction, congested pulps, and in opening abscesses, it has proved a valuable aid, entirely subduing pain without constitutional impression.

The continued use of pyrozone has intensified the statements made, and with reference to the five per cent. or antiseptic pyrozone it has been found especially efficient in two somewhat grave cases, one of necrosis where the external plate of the alveolus of the inferior maxilla had been (in extraction) ruthlessly separated from the symphysis to the angle, the teeth of the entire lower denture having been ordered removed by a physician, who had externally poulticed an abscessed right inferior first bicuspid. Marchand's medicinal peroxide was also used in comparative tests with pyrozone (three per cent. or medicinal), by injection in the sinuses. The resulting froth was in every instance thicker and more abundant with the pyrozone three per cent. than with the Marchand peroxide. This seems to indicate that the claim made by the maker of pyrozone three per cent., that their preparation *is* fifteen volumes and Marchand's but ten, is true. The abnormal tissue sooner returned to health, and the suppuration more rapidly ceases under treatment of pyrozone three per cent. than under Marchand's peroxide. In a case of severe ulceration of the left cheek, starting about the orifice of the duct of the parotid gland and extending to and slightly posterior to the condyle of the superior maxilla, the five per cent. strength of pyrozone has been employed in comparative tests with salicylic acid (saturated solution in alcohol). The pyrozone produced at first considerable pain, which rapidly subsided, leaving a clean non-suppurating surface. The salicylic acid produced pain for nearly six hours, and left a coagulum which in three days peeled off, leaving a tender surface with isolated spots of suppuration. The reduction in the depth of ulceration in both applications was evident, but the early relief from pain and the absence of the coagulum with the pyrozone five per cent. indicated it a preferable stimulant and antiseptic.

The great principle of cure is to remove abnormal conditions as nearly as possible, and let nature make the cure. In a general way, keep the body inside and out *clean*, and it will be healthy. This oxygen seems to effectively accomplish, and the apparent absence of all danger in its use places it in an enviable relation with other corrective agencies. The several preparations of pyrozone are presented to your investigation with confidence that they will be found efficient in controlling inflammation in all of its various phases, from incipient congestion to ichorous discharge.

ANCHORAGE OF GOLD FILLINGS.

BY S. B. PALMER, M.D.S., SYRACUSE, N.Y.

(Read before the Annual Union Convention of the Sixth, Seventh, and Eighth District Dental Societies of the State of New York, Oct. 25, 1892.)

In rearing structures of importance, whether bridge or building, a good foundation should be the first consideration. This principle applies as well to the foundation of fillings in teeth, which rest upon dentine, as differing and varied in structure and durability as rock and sand. It is customary to speak of this subject as anchorage, though foundations would better express the conditions. The architect's ideal foundation is "solid rock," yet he must contend with all the intermediate grades to "sinking sands."

To obtain good results from filling, it is as important that the structure and condition of the dentine be understood as how to insert a gold filling. There must be harmony between the two, or failure will be the result. At least three conditions are necessary to produce permanent gold fillings : normal dentine, accessible cavities, and good manipulation.

The ideal filling is one of cohesive gold throughout, well contoured and anchored in firm tooth-structure. These happy combinations are not always present, thus the requirements must be met by combinations of other preparations. It is true that a few skillful operators claim to accomplish all that is required with cohesive gold alone. Allowing this claim, there is a waste of energy for the operator, and needless strain upon the patient without corresponding benefits.

One thing should not be lost sight of which is a fixed law in nature: that a metal filling in the mouth exerts an electro-potential influence to decompose the fluids that may be between the filling and the walls of the cavity, or in the dentine itself when that is much below normal density; this decomposition is according to the conductivity of the plug and its powers to resist oxidation. Thus gold, being the best conductor and non-oxidizable, acts with greater persistency than tin or amalgam. Let no one be deceived, and make a mistake in trying to circumvent this law by perfect manipulation without a cavity lining which will exclude moisture.

Although cavity lining is not anchorage, it has much to do in laying the foundation for fillings. Your attention is called to a few specific cavities and conditions of dentine, with recommendations for treatment in starting fillings:

First: Assuming that an accessible cavity is properly prepared in dentine of normal structure, with undercuts or angles so that the first piece of gold inserted is held firmly, and upon which every other piece is made to cohere until the plug is completed, no finer filling can be produced, in appearance or for tooth-preservation, and thus credit is given to all who can do this superior work.

Care should be taken not to drill deep anchor-pits into the vital dentine, as formerly practiced; much harm has been done by or through the thermal changes thus introduced.

Second: Foundations of soft gold for cohesive plugs.

A large portion of gold fillings are done in this manner, and probably each operator has a method which suits him best. The one which best answers my purpose is to commence with one or more cylinders. Without describing the kind of cylinder recommended, we might as well say pellet; there is nothing in the market that answers the purpose, and we may better give a description how to make cylinders now than later on.

Ney's No. 4 foil is best adapted for cylinders, on account of the roughness imparted to it by the book paper under pressure. Smooth foil makes cylinders too hard. The leaf may be cut into half, third, or one-fourth strips, the ribbons folded to a width according to the depth of the cavity. Cylinders should be kept on hand, and the selection made as required. The narrow strips are rolled around a broach, or better, a three-sided point attached to a firm handle; when the roll is drawn from the point, the ends should be slightly pressed with pliers.

Let us now consider a cavity, medium or large, located in the grinding-surface of a molar, surrounded by firm enamel-borders; bottom of cavity left flat or concave, as the case may be, on removal of the decalcified dentine. If the dentine is firm and dense, the cavity is ready for the gold; where soft and sensitive, yet firm enough to warrant filling, varnish the cavity with some quick-drying varnish. I am using Canada balsam dissolved in chloroform. Without waiting for the varnish to harden, line the bottom of the cavity with a piece of gold foil of two or three thicknesses; upon this lining place a cylinder which will about fill the orifice of the cavity. If too large, compress; the length of the cylinder may be one-half or two-thirds the depth of the cavity. Then commence with cohesive gold; every piece introduced remains firm and is driven into the folds of the cylinder, condensing and expanding laterally every portion of the plug at the base by lateral pressure against the walls of the cavity, and the anchorage is perfect.

Third : Approximal cavities in molars or bicuspids, extending from the cervical border to the grinding-surface.

Contour fillings. Matrices well adapted to this class of work are made of rolled aluminum, wide enough to extend from the gums to one-half the length of crown, and beveled to knife edge. Insert the matrix of suitable thickness, and bend the ends away from the cavity, thus giving full view of and access to cavity. The matrix is used only to prevent the first pieces of gold from falling out, and not to mold the filling. The cavity being in readiness, the portion next to the gums only should be varnished, as any such coating on enamel or even dentine prevents the mechanical bite which gold has on enamel without varnish.

Select a cylinder smaller than the cavity, but longer than its depth ; carry one end of the cylinder into the cavity, and force the outer end toward the gum upon the incline made by the knife-edge matrix. When the cylinder has been firmly pressed to the cervical border of the cavity, another cylinder may be placed by its side, or one on either side, and packed as before ; thus a firm and broad foundation is laid, upon which cohesive gold may be packed to finish. When done, one end of the aluminum is bent straight, and the piece drawn out by the other end. When the projecting ends of the cylinders are condensed and the plug finished, no portion of the filling will be more perfect than at the cervical border.

Fourth : Condition same as the last described, except the cavity extends beneath the gum. A case from practice will illustrate.

A patient, while absent, had occasion to have a bicuspid filled ; the cavity extended beneath the gum. The dam was applied, and two unsuccessful attempts made to fill with gold ; the patient returned with a phosphate filling. Examination showed it useless to apply the rubber. The cavity was prepared, and filled with amalgam to the cervical border ; the remainder was filled with gutta-percha, and the patient dismissed. At the next sitting, the amalgam was cut down for a foundation, the rubber applied, and the tooth filled with gold. One year's time shows no discoloration from the amalgam.

Fifth : Cavities upon buccal or labial surfaces, extending beneath the gum, making it difficult to apply the rubber, especially the shallow, crescent-shaped cavities in centrals and laterals. Prepare the cavity with no more depth than is necessary to remove the softened dentine ; let the margin be distinct, and walls at right angles with the bottom of the cavity. Protect the teeth with a napkin or paper ; also fill with bibulous paper between the teeth on either side of cavity. Dry thoroughly the cavity and gums exposed, and varnish both cavity and gum, allowing the varnish to pass beneath the gum where there is space, which will prevent ingress of moisture by capillary attraction. Line the cavity with crystal gold ; first go around the border of cavity, then build across until the cavity is lined with a basket of gold; upon this foundation a solid gold plug may be anchored of any cohesive gold without danger of its falling out or of decay around it.

This method is the same as given by Dr. Howard in a clinic at Rochester, and it more than meets his claims in filling the porous dentine, whereby fluids are excluded and secondary decay prevented. With a little practice, filling is made easy with this class of cavities.

Modification and adaptation of the principles here laid down will meet all conditions of anchorage for gold fillings ; nor is this preparation of foundations less valuable for amalgam, gutta-percha, or phosphate fillings. Indications for use of varnish under oxyphosphate are sensitive dentine or near approach to the pulp ; no acid excitement is experienced with this cavity lining.

Under gutta-percha, it is valuable in fastening the filling to the walls of the cavity under conditions unfavorable for exclusion of moisture, as each piece of filling remains fixed in the cavity. It is true, chloro-percha and some of the essential oils also cause the filling to adhere, but the lining is much softer and yielding than varnish. In connection with amalgam, it may be used, as with gold, as a lining for cavities where poorly calcified dentine must remain as a pulp-covering ; also in cases where dependence is placed upon oxidation to fill the dentine. So far as I can determine, this answers the same purpose with much better appearance. Amalgam fillings inserted in heavy varnish remain bright upon the surfaces in contact with the cavity walls, which is not the case in any amalgam touching dentine.

Again, where there is no action upon the metal, there is none upon the dentine. Thus amalgam which contains no copper may be used with equally good results, without discoloring the teeth.

In conclusion, science teaches that the result of every operation in filling is the outcome of principles laid down in the foundation and observed to completion. Whatever is success at any time will be for all time, under the same circumstances and conditions.

Progress is based upon the knowledge and amplification of principles leading to better methods. Thus we are stimulated in search of more knowledge and higher attainments.

PROTRUSION OF THE INFERIOR MAXILLA: A CASE IN PRACTICE.

BY E. HENRY NEALL, D.D.S., PHILADELPHIA, PA.

THE correction of this deformity is a part of dental science that has well been classed as difficult and tedious, requiring much patience from both patient and operator. Many writers on this subject consider it well-nigh impossible if the person is above middle life.

The case I wish to describe is that of a lady thirty-two years of age, her mouth having the appearance as shown in Fig. 1, the eight anterior teeth of the lower jaw closing outside the upper arch, having been in that condition since the teeth were erupted, and a constant source of annoyance and chagrin.

Having a knowledge of her family, and knowing that her father and an aunt were affected in like manner, although in not so marked a degree, I concluded that it was a hereditary trait, and that it would be useless to attempt to correct it. I so advised her on the occurrence of each of her visits to my office, but as often the question was asked, "Will you try what can be done, as I am willing to bear pain and discomfort if the end can be gained?"

The inferior first molars having been extracted many years before, I supposed that I should be able to press the anterior teeth backward, utilizing the spaces between the bicuspids and molars; but such was not the case, as, after the completion of the work, the spaces between these teeth had not materially lessened.

Before commencing with the work, I thought it better to get the opinion of a brother practitioner who has had much experience and success in correcting dental irregularities. After a careful examination and study of the case, he stated that "he believed it to be amenable to improvement, but it would be a long and tedious case, requiring considerable patience, and most probably the construction of a number of appliances, and might take eighteen months or two years to accomplish."

Fig. 1.

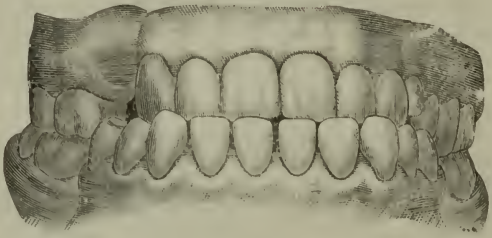
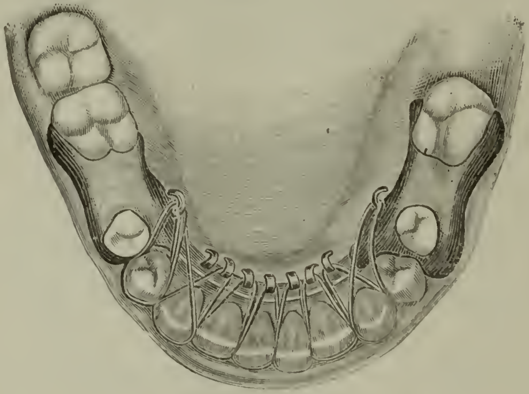


Fig. 2.

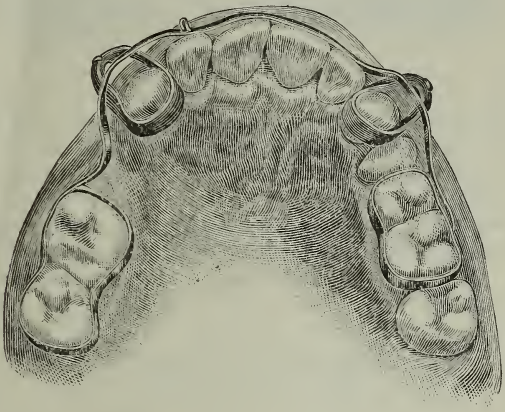


Having this statement before her, with all the discomfort it implied, she still insisted that I should make a trial, and, more to please my patient than with a hope of success, the work was begun.

The first and only appliance for the lower jaw (Fig. 2) was placed in position December 15, 1890, and consisted of a frame of platinized gold, having hooks soldered to the inner part and setting well back of the teeth, being held in position by vulcanite attachments surrounding and covering the molar teeth on each side, which also served to open the bite. These were cut away on the occluding surface from time to time, as the changes produced in the articulation rendered necessary. Rubber bands cut from French tubing were then placed around each of the protruding teeth and attached to the hooks on the frame. Pressure was also brought to bear upon the body of the maxilla by a cap-bandage, worn day and night, and only removed for a short time at intervals. The patient was instructed to press the jaw upward and backward with the hand. Heroic treatment, ably seconded by the patient, was used from the start.

On the commencement of the fifth week, January 16, 1891, an appliance was made for the upper jaw (Fig. 3), consisting of a platinized gold frame (with two hooks over the cuspids) extending outside the teeth and cemented by oxyphosphate of zinc to the molar teeth. This was worn just two weeks, and was used to pull forward the cuspids. With this exception, no pressure was used on the upper teeth, as the jaw was normal and did not need to be changed.

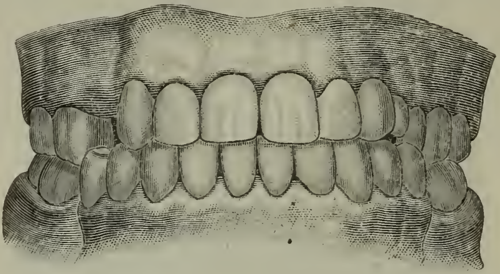
FIG. 3.



During the whole time of the operation, which covered precisely seven weeks and four days (the lower appliance being removed February 6), the patient called every other day to have the frame removed and cleansed and new rubber bands placed on. I have been thus explicit as to the time consumed during the operation, as it has never ceased to be a great surprise to me that the treatment should be followed by such rapid results. Everything seemed to favor the change, as not a band slipped out of position during the entire operation, although I frequently had from fifteen to twenty pulling at once. The two appliances were all that were necessary, and were not in any way changed during the operation. In moving the inferior cuspids I was forced to place the bands under the free margin of the gum, so that the teeth became loose in their alveoli before I could make any impression toward changing their position.

I am led to believe by the success attending this operation that the maxillary bones are amenable to rapid change if pressure is kept up constantly, and by right mechanical appliances. I know that I have recently moved a superior central incisor three-eighths of an inch in a lateral direction without causing any inflammation of the surrounding tissue, by the aid of the screw-jack in about four weeks' time.

FIG. 4.



To the question, What was accomplished? I answer, several changes took place. First, the lower teeth were brought inward and close together; second, a change was undoubtedly made in the articulation of the condyle of the inferior maxilla with the temporal bone; and, third, I believe a shortening of the angle of the jaw took place, which is borne out by a glance at Fig. 4, representing models which were taken immediately after the appliances were removed.

CROWNLESS TEETH.

BY C. W. STAINTON, D.D.S., BUFFALO, N. Y.

(Read before the American Dental Association, Niagara Falls, N. Y., August 3, 1892.)

IT has been my fortune to have in my practice a family presenting some traces of heredity rather unusual in their character. I exhibit to you casts of the mouths of three members of this family, being one-half of the children in it. The peculiar hereditary strain is the absence of crowns to their teeth.

The history of the condition is, as usual, quite meager. The father is an intelligent man of business, one of the prominent men in a large city, of good physical organization, and the father of six children by two marriages. By the first marriage he had three sons; the eldest has splendid teeth; the second and third sons are specimens of this peculiar condition, and I exhibit the casts of their mouths, marked 1 and 2. By the second mother there were two daughters and one son; the eldest by this second marriage, a young lady of eighteen, is the case presented in cast No. 3.

The history, unsatisfactory from a professional standpoint, but, as Dr. Talbot says, "as good as one ever gets," is about like this: The maternal grandmother had such teeth; she inherited them. Back of that the line is broken. Whether any of her brothers or sisters had such teeth is unknown. The only certain point the father knows is that he got this condition from his mother's side; that she inherited it also. His mother had eight children; his teeth were the poorest in the lot. Two others had very poor teeth, but whether they were wholly crownless like his is uncertain. His idea is that four of the eight had very good teeth, one middling, and three poor. That is all the history I can give you.

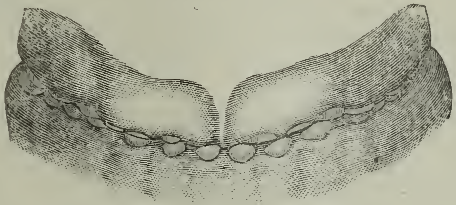
When I first became acquainted with the father, about twenty years since, he was wearing an upper denture which articulated against a few scattered roots in his lower jaw. I have made him in that time two full dentures, opening his mouth probably three-eighths of an inch, improving greatly the contour of his face by removing the too near proximity of the nose and chin.

This peculiarity, the shortening of the facial contour, the causation of which will be apparent to all, is the chief distinctive feature or deformity in all these cases. It is especially apparent in the third case, the well-developed miss of eighteen years, because the shortening of the face is accompanied by a retreating chin. (See Model No. 3.)

The first case, that of the second son, came under my observation in 1879. He had occasion to come in several times because some of these roots became sore and troublesome. I removed two at different times for this reason. In the summer of 1881, he having become eighteen years of age, and his mouth apparently well developed, I extracted the roots in the upper maxilla at the beginning of the summer vacation, and at the beginning of the September following made him a set of teeth. He had been waiting with great impatience for this time to come. It was almost impossible to articulate satisfactorily, and his course in elocution at the normal school had been largely a failure because the tongue had no front teeth to assist in the formation of certain sounds. His personal appearance was greatly improved; the shortened face became at once nearly normal, and the improvement in speaking and singing was very marked.

I do not think there has been any arrest of development of the arch in this case, although that is an assumption and not a matter of positive knowledge. He is not wearing the original plate,—a fit of nausea in April, 1889, over an open water-closet, separated forever this plate and the owner. He claims, however, that it fitted all right. You will see, when you look at the model of this mouth, No. 1, a most remarkable antagonism. Two surfaces could hardly be in more perfect apposition; he could almost bite a thread off anywhere about the ridge. The roots extracted in this case were very imperfectly developed, and were loosely attached to their sockets,—so much so that I extracted them all at one sitting, without an anesthetic and without any complaint on the part of the patient. Many were like loose deciduous teeth.

FIG. 1.

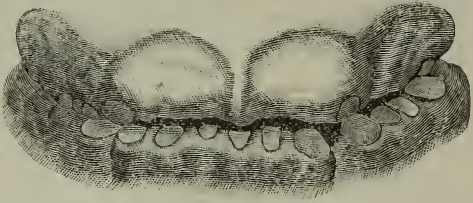


The third son, seeing the improvement in his brother's condition, was desirous of some such treatment; but on account of his youth I kept him waiting until he became eighteen years of age, when, in October, 1885, I made him an upper plate. The model shown of this case, No. 2, is not so perfect a representation of the conditions as it ought to have been. I forgot to take an impression of his teeth until after I had extracted several of the roots.

With a remembrance of the ease with which I had extracted the roots in the first case, I tried to extract these, with the assurance that it would not be very tedious to the patient; but I found these roots better developed and very adherent, so that it was extremely difficult to extract them at all, and after removing the roots of the incisors and the bicuspids of one side, I ground off the remaining roots and made a plate over them.

The model in this case shows the condition after the mouth was prepared for a plate, and not, as it should, before anything was done. A peculiar condition in this case was that the front roots could not be made to touch each other. Of course my model makes this condition more pronounced, because the roots of the incisors are gone, and some absorption has taken place in the few months between extraction and the taking of the impression, and I have also smoothed off the roots of the cuspids. But he never was able to get the incisors within a line or two of each other; and yet see how smooth the lower roots have become, and these have not been touched by the wheel.

FIG. 2.



The making of a denture for this case was not nearly so easy as for his brother. To open the bite sufficiently for anything between the molars made the incisors too prominent for a mouth never showing any, and with a lip that lifted as far as the nose would allow at the slightest provocation. My first attempt was not satisfactory, but a second was fairly successful. This patient is one of those who will crack nuts, bite hard candy, etc., with his teeth, so that I have had to replace his plate, made in 1885, simply because he had cracked these thin, pinless molars all to pieces.

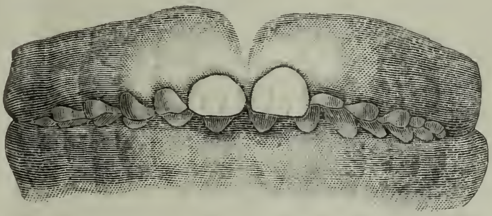
Model No. 1 shows apparently purely mechanical abrasion.

Model No. 2 shows the same condition posteriorly, but the anterior roots show chemical rather than mechanical abrasion. This subject tells me he never has been able to bite anything with his front teeth, as they never came together.

Model No. 3, that of the miss of eighteen years, shows what neither of the others shows: a fairly good crown to each central incisor.

This model is articulated with her mouth at rest, but she has a rather unusual ability to project the lower jaw. This case seems to show that there was an effort to produce crowns, but so poorly were they organized that they have been easily obliterated ; what is left of the centrals is simply for the reason that she cannot project the lower jaw sufficiently to wear these away. This model shows plainly another thing : the presence of decay among these teeth. The first permanent molars above and the first and second permanent molars on one side below show extensive caries ; there is almost no trace of caries in the other cases. There has been no attempt to do anything in this case. The two central incisors give some appearance of teeth, although they are quite discolored. The young lady assures me that she is going to let them go as they are as long as she lives.

FIG. 3.



In all these mouths the color of these roots runs from a dark amber to that of an old clay pipe black with nicotine. I have known all these cases since they began to get their permanent teeth. Their teeth have always presented this same crownless appearance ; but I am persuaded that the effort was made to give them normal crowns, but so soft were they that they were soon worn smooth. The lower wisdom-teeth in Nos. 1 and 2, as also several of the teeth in No. 3, are indicative of this. Case No. 1 has apparently transmitted this trait to his children. A little son about four years old has crowns to the deciduous teeth so poor that they have dissolved off almost as soon as they had appeared through the gums. Of course, we can only conjecture what the permanent teeth will be, but the father has no faith that they will be any better than his own, and I think he has reason to fear this.

THE ADVANTAGES OF NITRATE OF SILVER IN DENTAL PRACTICE.

BY DR. A. M. HOLMES, MORRISVILLE, N. Y.

(Read at the joint meeting of the Sixth, Seventh, and Eighth District Dental Societies of the State of New York, October 26, 1892.)

IN presenting something of my personal experience in the use of nitrate of silver in the treatment of diseases of the teeth, it is with the hope that as this subject has been recently discussed in dental societies, by reason of the able papers of Dr. Stebbins, it has not become threadbare, and something of interest will be found in its consideration. The character and scope of the discussions that I have read on the use of nitrate of silver for the treatment of diseased teeth, have been such as to impress me with the belief that its benefits for such use are not generally understood and appreciated.

Nitrate of silver is conceded to rank as one of the most efficient and reliable remedies in medicine and surgery, and when its merits are fully known it is believed that it will be found equally efficient in the treatment of a large class of diseases of the teeth.

Take, for instance, decay in temporary teeth. We all know from individual experience how trying it often is to fill the teeth of small children in the ordinary way of making such operation; how they resist all efforts to excavate and fill sensitive cavities. By the use of nitrate of silver these operations are more easily made. Take approximal cavities in the posterior teeth, where the child is not too fearful and timid; cut away the walls to a V-shape, and with a piece of gutta-percha, softened by heat, of the proper size to fill the space, bring the surfaces to come in contact with the diseased part of the teeth, in contact with powdered crystal of nitrate of silver, and carry it to the place in the tooth or teeth prepared for its reception, packing it firmly and leaving it there to be worn away by use in mastication; when that takes place, the surfaces of the teeth treated will be found black and hard, with no sensitiveness to the touch or to change of temperature, and they will remain so indefinitely. In case the child is so timid and fearful as to prevent this course, dry the cavity, take out such softened dentine as the patient will permit, carry the crystal on softened gutta-percha into the cavity and pack it, leaving it until such time as desirable to replace it with a more thorough operation. On removal of this filling the dentine will usually be found hard without sensitiveness, and needing but little excavation for the final filling.

I have treated diseased pulps with the nitrate-of-silver crystal very frequently since early in my practice, especially in temporary teeth, where devitalizing pulps with arsenious acid is unsafe, applying the crystal direct to the exposed pulp, usually with relief to the patient.

Nitrate of silver is a resolute remedy; it cauterizes the surfaces of the soft tissues to which it is applied, but does not penetrate them as does carbolic acid, nor does it involve the entire pulp in an inflammatory process, tending to destroy the whole mass, as does arsenious acid.

In cases of extreme sensitiveness about the necks of the teeth at the margin of the gums, where the tendency is to softening of the tissues of the tooth, a condition very annoying to patient and troublesome to the dentist, nitrate of silver has proved more successful with me than any other remedy in checking the progress of the disease and relieving the patient. The salt may be applied directly to the sensitive part without pain to the patient. A good method that I have practiced is to cover the parts after the nitrate is applied, with a phosphate filling-material of a cream-like consistence. That hardens, and prevents the washing away of the remedy and the surrounding parts from coming in contact with the salt.

Erosion or wasting of the teeth is checked more perfectly by nitrate of silver than by any other remedy that I have ever used. The salt is applied to the affected parts, and covered with a phosphate filling to protect and retain it in place until it is firmly established in the dentine. In cases where the progress of the disease has gone so far as to require restoration by filling, this preliminary treatment is very beneficial in preventing a further waste of the tooth-substance and consequent failure of the operation.

In cases of superficial decay in soft teeth, where dark surfaces are not objectionable, nitrate of silver is very beneficial. By removing the softened portion of the tooth, polishing the surface, and rubbing the salt into the dentine, using a warm burnisher, and varnishing the parts to protect and hold the remedy until taken into the organic matter of the tooth, you will have a dense, hard surface, free from sensitiveness in mastication or change of temperature. In filling cavities in this class of teeth having an excess of organic matter, with which there is so much trouble from chemical or electro-chemical action between the walls of the cavity and the filling, an application of nitrate of silver to the walls of the cavity will effectually prevent these unfavorable results. The remedy is taken up by the dentine penetrating the surface sufficiently to prevent any such action between filling and tooth. This treatment will at times result in a darkish hue to the walls of the cavity about the filling. This I explain to the patients, that they may know that it results from the treatment and that it is a proper and favorable condition for permanency of the operation. Also in crowns and bridges where the dentine is uncovered, it is beneficial to use this remedy on the teeth and roots used to sustain the bridge or crown, as a protection against thermal change and decay. The use of nitrate of silver may be varied by applying the rubber-dam and using a strong solution of the salt, and evaporating the moisture by use of a hot-air syringe. When used in this way, a solution of soda can be applied to the parts to neutralize any acid remaining. In the class of cavities extending so far beneath the soft tissues as to render the use of the rubber-dam or matrix impracticable, and a leakage of the surrounding tissues is liable to enter the cavity while introducing the filling, and injure the permanency of the operation, cauterizing these tissues thoroughly with nitrate of silver will effectually prevent such result.

After the diseased sockets and the deposit from the roots of the teeth are removed, nitrate of silver has proved more successful in restoring a healthy condition of the parts than any other remedy that I have used in the treatment of pyorrhea. The finely pulverized crystals may be applied to the diseased parts by the use of a small spatula of wood or of platinum ; by slightly dampening the end of the instrument and applying it to the salts, it will adhere sufficiently, and is easily placed in the space between the gums and the roots of the teeth. After the remedy has been a few moments in contact with the part, it is best to rinse it with water by the use of a syringe.

In extirpation of pulps, where the pulp-canal is sensitive at or near the apex of the root, nitrate of silver crystal carried to the sensitive part and left there for a few hours usually relieves the trouble, and the canal can be filled without pain or danger of unfavorable results.

These are some of the many uses where nitrate-of-silver crystal is advantageous in dental practice. Nitrate of silver is a powerful remedy. It acts promptly, with great uniformity, and leaves its track in darkened surfaces when applied to the teeth. This should be considered, and its use governed accordingly.

MATRICES.

BY JUNIUS E. CRAVENS, D.D.S., INDIANAPOLIS, IND.

(Read before the American Dental Association, Niagara Falls, N. Y., August 3, 1892.)

It is a test of an operator's judgment sometimes to determine whether he shall use a matrix or merely a support for his filling-material. There is a wide difference. Webster's Dictionary says that "a matrix is a mold; the cavity in which anything is formed, and which gives it shape." If this definition is correct, not everything which dentists build gold against should be dignified as a matrix. A neighboring tooth often serves the purpose of a support, but who would regard a supporting tooth as a matrix?

A matrix for filling should offer certain advantages, such as thinness for economy of space; close conformity to cavity-margins, however irregular; sufficient malleability to enable the operator to bend and dilate it at any part and to any extent desirable; it should be cheap enough to be thrown away after once used. Some approximal spaces are impassable, of course; but extensive preliminary wedging should never be necessary to adjustment of matrix or support, otherwise the device is too thick and badly designed, and the operator's judgment is at fault.

Some operators—perhaps many—use closely adapted matrices for gold filling in compound approximal cavities in bicuspids and molars, and it is not my purpose to criticise their methods, because of lack of sufficient opportunity for observing results; but criticisms have recently appeared in some of the dental journals, one writer going so far as to declare that perfect gold filling cannot be done in matrices. I think he is mistaken, for every cavity is a matrix so far as it affects the form of its contents; but from the few cases from the hands of others that it has been my privilege to observe, and a fair number of my own, I am satisfied that failures may easily be made, and that an operator's confidence in matrices sometimes is abused, because failures at obscure margins may not be discoverable until after the completion of the work. The usual fault with matrix-filling consists in imperfect adaptation of filling-material at cervical and lateral margins. For some operators to meet this objection may be easy, but there are those of us for whom it is not.

Gold cannot always be depended upon for correct adaptation at margins, unless in excess, and close matrices do not admit of excess there. Perhaps there are operators who can secure exact marginal fullness with gold, no subsequent dressing or finishing being required, but most of us find it necessary always to dress away some at the margins for security.

By a support, as distinct from a matrix, is meant something that can be placed between two teeth, one or both of which may require filling, and serve to support the filling-material until secure, but without effect upon the contour. A supporter should also economize space between the teeth to the same degree as a matrix. Nothing more than the slightest primary wedging is really necessary for adjustment of a supporting device of proper thinness. A supporter should be of metal, very thin, springy, non-malleable, with no attempt at conformation to cavity-margins. On the contrary, the margins should stand free, particularly in filling with gold, in order that an excess of material may occur there for subsequent dressing down.

Plastics.—In filling with amalgam or cement in compound cavities in bicuspids and molars, matrices are advantageous. In fact, in any cases where contouring with plastics is intended, and reversing the rule for gold, the matrices for plastics ought to be closely adapted at all involved margins, and should mold the contour to any desired degree, because the plastics are accommodating, and with careful manipulation a perfect cast of a matrix and approved marginal adaptation are attainable by all.

Matrices offering the advantages named in this paper may be constructed of German silver, rolled to U. S. standard wire gauge, Nos. 30 to 34, strips of which should be cut and fitted around the cervix of the tooth, and to conform to the curves of the gum in the same manner as in fitting bands for gold crowns, etc., exercising care to avoid occlusion with teeth of the opposite jaw. A band should close with a lap-joint next to the cheek, and should be fastened with soft solder. In position, such matrix may be dilated or bulged at any part, the metal yielding readily to moderately firm pressure so as to conform to an approximating tooth or give fullness at any point.

Amalgam thus supported may be permitted to stand several hours to acquire hardness, and often to accommodate the dentist's time-demands. No wedging, no ribbon-saw is necessary, because the band has guaranteed enough space for finishing purposes, admitting the thinner strips employed for that purpose.

In filling with gold in the same class of cavities, plain shields of the same thin German silver will hold all the space required, and at the same time, if a little more space should be desirable for finishing purposes, it may easily be gained during the operation of filling by driving the gold firmly against the supporting shield, the gold actually wedging the teeth slightly apart.

I have made beautiful and durable contours with os-artificiel by use of the band matrix,—a fact which is merely mentioned here to show the scope of utility of the band device. The German-silver band is easily constructed, easily adapted to margins, and made to mold any vertical contour, and is cheap enough to throw away after being once used. To remove one of these band matrices, the lap-joint should be opened, although it often may be done without.

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PROCEEDINGS OF DENTAL SOCIETIES.

AMERICAN MEDICAL ASSOCIATION—SECTION OF ORAL AND DENTAL SURGERY.

(Concluded from page 921.)

THIRD DAY—*Afternoon Session.*

IN the absence of the chairman of the section, Dr. W. C. Barrett was called to the chair, and the section was called to order at 2.30.

Dr. M. H. Fletcher read a paper, of which the following is an abstract, entitled,—

A UNIVERSAL MENTO-DENTAL SPLINT.

Before describing the special apparatus which he had devised and constructed for the treatment of his case of fracture of the inferior maxilla, the essayist reviewed the splints and bandages, and in particular the mento-dental splints in general use for the treatment of this class of fractures. He said,—

The simplest and most effective form of external apparatus, and by far the best in a very large majority of cases, is the four-tailed bandage, two of the tails being carried over and tied on top of the head, the other two carried back and tied around the nape of the neck, the part covering the chin ofttimes being reinforced by pasteboard or sheets of gutta-percha. This method with its variations, when the fracture is simple with little or no displacement, is undoubtedly the best, since it brings the lower teeth in perfect occlusion with their antagonists, and holds them in their proper places as well as puts the fractured ends of the bone in direct apposition, so that when the fracture is healed the jaw is in every way in its proper and normal condition, both for use and appearance. The great objection to this form of apparatus, also in interdental splints, is that the patient must be fed on liquid foods. Gross says, "I have known great emaciation to arise from inability of the patient to take appropriate nourishment during the long confinement of the parts. All interdental splints, also wires and ligatures, are usually accompanied by external bandages to hold the lower jaw against the splint and against the upper teeth, so that the inability to take proper nourishment enters largely into the objection to these forms." Dr. E. H. Angle's method is a most excellent one. It consists of buttons or short pipes soldered to bands which are fitted to the appropriate teeth, and these bands are tied, wired, or fastened together with rods thrust through the short pipes on the bands, and held at one end with a hook on the rod and a nut screwed onto the other end.

This method has the very great objection of complication, for one is certainly safe in saying that hardly any surgeon, and very few dentists, even after long experience, are prepared to or can fit a band to a tooth firmly enough to withstand much strain. The essayist had used Angle's apparatus in a number of cases of regulating, and to fit them firmly to the teeth in the case of a fractured and inflamed jaw would, in his opinion, certainly be difficult.

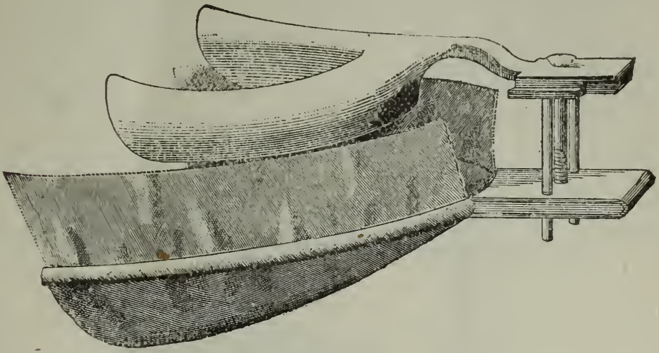
Mento-dental splints or appliances made to grasp the lower jaw are not new. They are made with one part fitting the crown of the teeth, the other part the chin and lower border of the jaw.

In 1799, Rutenich, a German surgeon, used such an appliance. Bush in 1822, Houzelot in 1826, Hill in 1866, Lonsdale in 1867, and Moon at a later date,—all these used mento-dental splints, and all with reasonably good results. These splints have the great advantage of allowing the patient to take nourishment of any kind demanded. They also have the disadvantage of becoming foul after being worn awhile, as is the case with any appliance worn long in the mouth.

Heath remarks, "The great difficulty in using all forms of rigid splints to the jaw is the tendency of the support for the chin to produce abscess and ulceration by the pressure upon the sharp border of the bone. These splints do not seem practicable used back of the second molar, but certainly work well with fractures anterior to that point."

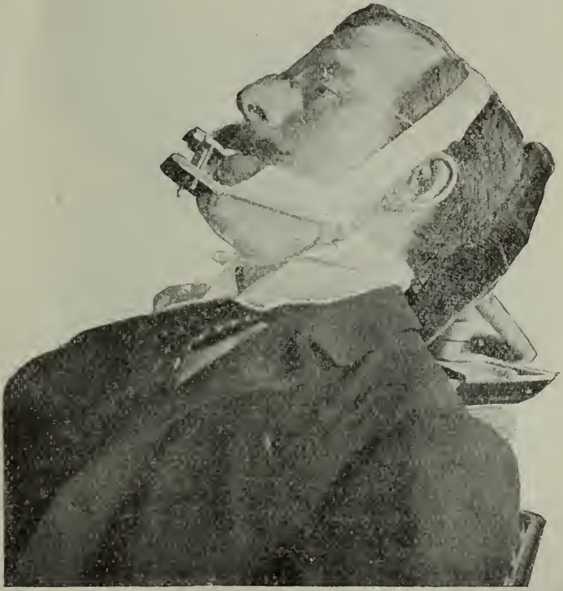
The essayist's experience coincides with what Heath says, for in the case to be reported abscesses made their appearance, and the splint was necessarily removed much earlier than desired on that account.

FIG. 1.



The case resulted reasonably well, however, as the model will show; but he had a form of a chin-support to present which is designed to do away with the objection spoken of by using a canvas instead of a metal support, the canvas being stretched across a fork, which straddles the chin. (See Figs. 1 and 2.)

FIG. 2.

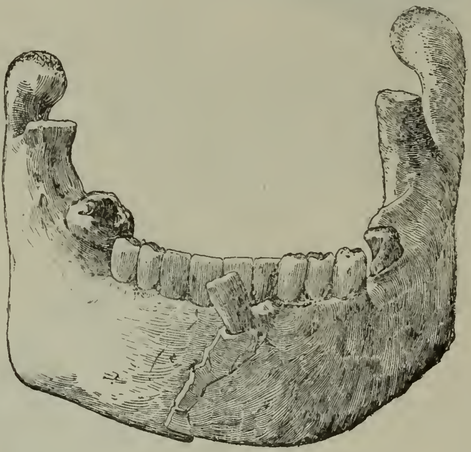


He reported the following case:

"Mr. B. H., age thirty-six, on the 23d of last December was attacked by three highwaymen for the purpose of robbery, but being a good fighter he laid out the three robbers and proceeded to his home. After having somewhat subsided from the excitement of the melee, he felt a pain in the lower jaw. The next morning he proceeded to a surgeon, and found that his jaw was fractured, one of the men having struck him a heavy blow on the chin with his fist. There being no displacement, the jaw was bandaged in the usual way, and in three weeks he was back at his work again. Mr. H. is a woodworker in a carriage factory.

"On the 18th of January, three days after he had gone to work, Mr. H., with five other workmen, was called to test a new fire-ladder, and being the first to mount he was at the top, about thirty feet from the ground, when the ladder broke, and, falling, he struck the pavement with terrific force, breaking both arms below the elbow, and crushing the jaw in a frightful manner, breaking it through the old fracture. The nearest surgeon was called, who dressed the wounds, and sent the men to their respective homes. Mr. H.'s jaw was dressed in the usual manner with a four-tailed bandage. Ten days afterward, finding that the jaw was not doing well and that the fracture had not been reduced, the writer was sent for by the attending surgeons, to see what could be done with some different kind of apparatus. After an examination it was found that the jaws were so closely set together that it seemed impracticable to take an impression for making a plaster model, with the idea of breaking and resetting it in normal position for the purpose of making an interdental splint, as suggested by Heath and others. So we conceived the idea of making a mento-dental splint of two block-tin impression trays, such as every dentist has at hand. This splint was worn for five weeks, but had to be removed in consequence of two abscesses forming, one on either side of the chin, where the chin-support pressed hardest on the soft tissues. The fracture was comminuted and compound on the inside under the left bicuspids, the point of the right half and some of the broken pieces being through the flesh

FIG. 3.



at the place. The left lateral and the alveolar process, which had surrounded it, was taken away with the fingers from the front side, and afterward some smaller pieces of bone were removed from the wound in the same place. There was about one-quarter of an inch of the bone lost, and the left central now stands adjoining the left cuspid. (See Fig. 3.) The remaining incisors were all loose.

"Twelve days after the accident, the splint being ready, such plastic adhesions as had formed were broken up, the left lateral and loose pieces of bone were removed, as stated, the two halves of the bone were reduced and ligated as nearly to their normal position as possible, and while being held firmly in position by an assistant the impression tray used on top of the lower teeth was filled with plaster of Paris, which had been mixed with a one grain to the ounce solution of bichloride of mercury for antiseptic purposes. The splint (see Fig. 4) was applied, and the parts held firmly in this position with the hands until the plaster had time to set, the screw of the splint being tightened at the same time, and tightened from time to time as became necessary.

FIG. 4.

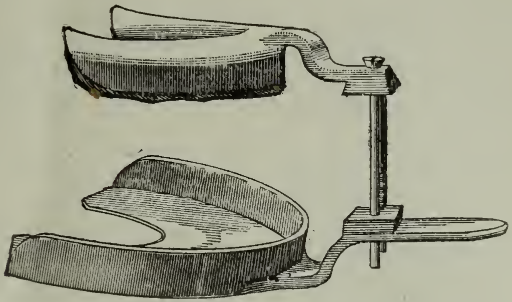
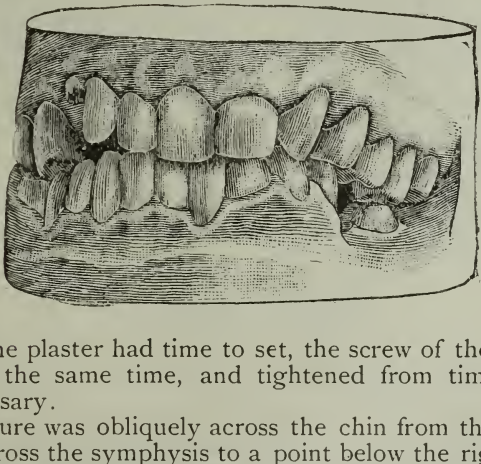


FIG. 5.



"The fracture was obliquely across the chin from the neck of the left cuspid across the symphysis to a point below the right cuspid, as shown in the plaster model. The result is to be seen in the model, made from impressions taken after the fracture had healed." (See Fig. 5.)

[Fig 1 represents the ideal universal splint, the chin-support being made of a fork of stiff wire, across which is stretched heavy canvas, the margin of canvas being allowed to stand up long enough to pin or sew the head and neck bandages to, thereby gaining the advantage of a four-tailed bandage in addition to the mento-dental feature of the splint. In the early stages of the case the tails can be kept tied, excepting at the times of feeding, or left off altogether, as the case may require. Additional trays of different sizes may be made to suit the case; they are inserted into the splint by removing the screw, and withdrawing from the slot the one in place and inserting the one desired. The size and shape are further modified by bending the cup (which is made of block tin) to any shape desired. The part of the splint coming down and fitting on the crowns of the lower teeth is designed to be filled (when applied) with plaster of Paris, softened gutta-percha, or other material suitable for holding the teeth firmly in position. This splint is designed to be made and kept on sale with other surgical supplies, one outfit being sufficient for all cases where it may in any way be demanded.

Fig. 2 represents the splint in position. The splint represented in Fig. 1 would not need the cotton packing, and can have the four tails attached or detached at pleasure.

Fig. 3 represents a plaster model of the jaw-bone, as near like the jaw when found as could be constructed; the projecting left lateral incisor and the amount of bone, as represented by the line, were lost.

Fig. 4 represents the splint used in the case, which is constructed out of the ordinary block-tin impression trays, the fittings being made of brass plates and wire soldered together with soft solder; the screw is an ordinary stove or carriage bolt, made to cut its own thread in the soft solder which has run in the hole in the lower part of the apparatus, and is to be tightened or loosened with an ordinary screw-driver. The chin-support was packed with cotton wool.

Fig. 5 represents the case after recovery.]

Discussion.

Dr. John S. Marshall said he was interested in the splint, and that while it served its purpose admirably, he thought the better way to treat fractures of the inferior maxilla was to wire the parts firmly together with a silver wire, as the mouth is so much easier to keep clean than when a splint is worn. In such cases he dissects down the tissues till the edges of the bone are reached, the tissues and the periosteum being laid back. A drill is then passed through near the end of the bone, care being taken to avoid the roots of the teeth and the inferior dental canal. A silver wire is then passed through the holes in the ends of the bone, and the parts brought together. Two or more such sutures are made, and secured until the fractured parts are immovable. He has treated many such cases in this way without any bandages. No after-treatment is required except frequent washings with an antiseptic mouth-wash, for which he prefers Thiersch's solution, as follows:

Boracic acid, 12 parts;
Salicylic acid, 4 parts;
Water, 1000 parts.

This is a good antiseptic: is not dangerous, nor unpleasant to the taste, only a little bitter.

He related the cases reported on pages 575–6 of the DENTAL COSMOS for 1892, and in reply to a question said it was usually necessary to leave the wires in place from four to eight weeks, the time depending upon circumstances. In nearly all cases suppuration will take place and retard the knitting of the bone.

Dr. Curtis said the results of the case reported by Dr. Fletcher are exceptionally good, and the splint is very well adapted to the class of injuries it was designed for. He thought in hospital cases the plaster bandage was perhaps as good as anything,—that is, where there are teeth in both sets ; but before it was applied several layers of cotton should be placed under the chin whenever the bandage will come in contact, to lessen the liability of abscesses forming.

Dr. Marshall said that the evidence of all surgeons to whom he had talked upon the subject was that a splint of this character was always a failure where there was any displacement, and that the system of wiring was always used.

Dr. Allport said that he agreed with Dr. Marshall that wiring was better than any splint. He believed that he himself was the first man who used wire for this purpose. It was about thirty years ago, and he got good results. He related the case of a lady who fell from a step and broke each jaw in four pieces. He wired all the pieces in place, and the bones united perfectly, and the result was in every way satisfactory. He thought that oral surgeons were better able to handle such cases than the general surgeon.

Dr. Barrett reported a case of a boy who was run over by a heavy wagon in such a way as to crumble the lower jaw frightfully. He was brought to the city and put in the hands of a competent and skillful surgeon, who wired the pieces together by wire around the teeth. When the mouth was open the parts were kept in proper position, but when shut the jaw went away around to one side. Dr. Barrett, being called in consultation, found four physicians there, all of whom confessed that the injury was beyond their skill to repair, hence they had called him in as a specialist in these things. The boy had been under an anesthetic for most of the time for four hours.

Reasoning by exclusion, as there was no crepitation and no fixation, he concluded that there was no luxation, and no complete fractures that were not securely wired, and that there was only one possible cause for the condition : an incomplete or "green-stick" fracture across the angle of the ramus. With the muscles relaxed the jaws fell directly down, but when the boy attempted to close his mouth the temporal and internal pterygoid, with some of the fibers of the masseter, not being counteracted on the other side, drew the jaw to one side, it bending or yielding at the point of the incomplete fracture.

The boy was taken to Dr. Barrett's office, and gutta-percha impressions taken of both jaws. The impressions were trimmed to the proper shape, and a notch cut in front for feeding through, and the boy having been again anesthetized, the occluding surfaces of the gutta-percha impressions that were to serve as splints were warmed until they were adhesive, and placed upon the teeth ; then by main force the jaw was carried to its proper place, the two gutta-percha splints stuck together, and the whole was fastened with a two-tailed bandage. The operation was a perfect success.

Dr. Fletcher said that though wiring was undoubtedly to be preferred in many cases, it was not admissible in such as he described, because in his case at least a quarter of an inch of the bone was lost by comminution, and to wire the bone together would make the proper occlusion of the teeth impossible.

The subject was passed.

Dr. J. S. Marshall read a paper which he had originally prepared for the First District Dental Society of the State of New York. The paper had been to some extent rewritten for the section, but it was so substantially the same that instead of presenting an abstract in this place we will refer to our publication of it on page 464 of the June number of this volume of the DENTAL COSMOS.

There was no discussion of Dr. Marshall's paper, but Dr. Barrett asked the privilege of reporting a case by title to be published as a contribution to the subject.

On motion, the section adjourned.

Dr. Edward C. Briggs, who was on the program for a paper, could not attend the meeting, and sent his paper to the secretary, who, however, received it too late to read it before the section.

We present below an abstract of Dr. Briggs's paper :

THE REMOVAL OF THE TOOTH-PULP BY THE USE OF COCAINE.

In October, 1890, I read a paper before a society in Boston on this subject, and recounted many successful operations done since the preceding May. Since then I and some of my neighboring associates have been so successful that I feel constrained to bring the matter before this association, for a wider field in which to sow such good seed. In almost all cases of exposed pulps the pulp can be paralyzed and removed with no pain or discomfort to the patient. Cases which would seem most antagonistic to any radical treatment yield most gracefully to this.

Pulps of known irritability, which would resist arsenious acid, are satisfactorily disposed of by this method. Teeth are not "devitalized" by this treatment, as is so often the case with strong caustics, but are simply made "pulpless," retaining their color and vital connection with the jaw.

The immediate root-filling which is a part of the operation seals the tooth before germs can get in, and there is no resulting abscess to be feared.

To operate, it is necessary to have, first, a tightly packed, smoothly running hypodermic syringe, with a flexible, blunt point. This latter condition I obtain by putting the point of a Dunn syringe into a hypodermic syringe.

Second, a freshly prepared twenty per cent. solution of hydrochlorate of cocaine. (I have not yet had the opportunity to experiment with so-called milk of cocaine, which is suggested as being better.) Having an exposure of the pulp (the smaller the better), first apply on cotton some of the cocaine solution. This in a few moments makes the exposed part approachable, and if the opening through the dentine to the pulp is not as large as the end of the syringe-point, the syringe can be placed immediately over the point of exposure.

Having adjusted the syringe-point, the piston is then to be firmly and steadily pressed down,—slowly at first, and with increasing pressure,—finally to be pressed down with considerable force, carrying the solution up and around the pulp to its extreme end. At the first impact of the liquid against the pulp the patient sometimes feels a shock,—not worse, however, than one gives the patient when feeling with a probe to see if previous application of arsenious acid has done its work. If now the syringe-point has been properly directed and fits over the exposure or into the opening in dentine so as to allow but little back flow, the operator can immediately open freely into the pulp-chamber with a bur, remove the pulp from the canals with barbed broaches, or even better, where possible, enlarge the canals and remove the pulp at the same time with a Gates-Glidden drill.

The advantage of this latter method lies in the fact that after the pulp has been entirely removed by a broach, if there is any delay in putting in the filling the inner walls of the root or roots become sensitive again, and it is as impossible to pass a probe into them as when the pulp was *in situ.*

A case or two by way of illustration :

Miss L. had been in Philadelphia during the winter, and having gone away without the usual autumn examination, a capped pulp had come to grief, and an eminent dentist in Philadelphia had applied, presumably, arsenious acid. The patient returned to Boston with cotton dressing in the tooth, and reported to me the day before departing for Europe, wishing to have the tooth filled. She said the tooth was " dead," but when I passed a probe into the distal root I found it very much alive. It took but a moment, however, to pass a small syringe-point down into the root, inject the cocaine rather forcibly, and then with barbed broach remove quite a sizable piece of root-pulp. The roots were then washed with antiseptics, dried, and filled with gutta-percha. This case is typical of a large class, and we all of us have or have had teeth with " life in the end of the roots," which have baffled our efforts to completely remove, and which therefore we have had to keep dressed and temporarily filled for months, and even years, waiting for complete death. As a fellow-practitioner remarked to me the other day, the operation was worth everything to us for just those cases alone.

Mrs. R. is a patient of my brother's. He was called to see her for the first time in her sick-room, where she had been a nervous invalid for over a year. Two or three teeth presented exposed pulps. My brother thought to disturb her least by making application of arsenious acid. It was with the too-frequent result,—inflammation, pain, and no destruction of pulp. He then tried the method described here, and removed the pulps of two teeth without the slightest shock or pain to the patient ; this, too, under the most disadvantageous circumstances, at the residence of the patient. I have the record of fifty or more cases, almost all of which can be classed as perfectly successful. Where failure has been the result, it has been due to defect in carrying out the detail of the operation as described : failure to get syringe-point directly over exposure ; failure to have syringe in perfect working order ; failure to use at least a twenty per cent. solution ; and last, but not least, neglect to have a fresh solution of the drug.

FIRST DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.

THE First District Dental Society of the State of New York resumed its regular monthly meetings on Tuesday evening, October 11, 1892, at the New York Academy of Medicine, No. 17 West Forty-third street; the president, Dr. William Carr, in the chair.

INCIDENTS OF OFFICE PRACTICE.

Dr. Kasson C. Gibson. This summer I had an opportunity of examining a pug dog (a mongrel) who had a hare-lip and cleft palate. The fissure extended through both the hard and soft palates. This case interested me, and will, I think, interest the profession. I have made arrangements to obtain the skull of the animal in due time, and shall donate it to the collection of the Odontological Society.

Dr. Charles B. Atkinson, of New York city, was introduced by the president, and read his paper entitled "Fancies and Some Facts."*

Discussion.

Dr. C. F. W. Bödecker. I have had some little experience with pyrozone. When the agent of McKesson & Robbins brought me a small bottle of it last fall, I took a slice of a tooth and put it into some of the solution, and afterward mounted it and examined it; but I could not see any difference whatever in the appearance of the enamel, at least not any corrosion. I have used it to a limited extent in cases of pyorrhea alveolaris, also in bleaching teeth and as an application to canals of teeth previous to filling, to which I think it is very admirably adapted. It will prevent the occurrence of abscesses, I think, in a very great measure; in fact, in all of the few cases, which were rather severe ones, that I have used it, I have not observed any subsequent trouble. The teeth are beautifully white after filling, and have remained so, as far as I have been able to observe, and you could hardly distinguish whether they were dead or living teeth. I have taken the precaution, after the pyrozone was applied, to wash the teeth again with alcohol. The agent showed me how inflammable pyrozone was. He took a piece of paper, dipped it into the pyrozone, and let it lie there a few seconds, when it burned right up. In using it for bleaching purposes and in treatment of canals, I prefer to have the rubber-dam adjusted on the teeth. My experience with it in pyorrhea alveolaris, as I before stated, has been limited; but what little I have had was very favorable.

Dr. Wm. Carr. Dr. Bödecker has said that pyrozone had no corrosive effect upon enamel. I would like to ask him what effect it had on the dentine.

Dr. Bödecker. No corrosive effect that I could observe; but this was an old, dead tooth. I wanted to see how it bleached.

Dr. Carr. Dr. Atkinson stated that he used pyrozone for the removal of green stains upon deciduous teeth. I would ask him if he thinks it advisable to use this preparation when iodine would answer the same purpose?

Dr. Atkinson. I have had no experience with iodine for this purpose, so I cannot say ; but pyrozone is unobjectionable to the sense of smell, and I think iodine is not.

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* See page 968, current number.

The President. How strong do you use it?

Dr. Atkinson. Full strength, five per cent. The surface action of it seems to be greater and the pain much more intense than when it is in a pocket or an abscess. Whether it is that the evaporation of the ether is less rapid in the latter case or not, I do not know. I injected two syringefuls of the five per cent., about three and a half drachms, as a demonstration in an abscess, in the case of necrosis referred to in the paper. Parts of the bone had come away, but a small piece remained at the angle. The pieces were all sequestrated before I saw the case, otherwise I should have burred the caries off. These two charges were very little more painful than the three per cent., which is the medicinal preparation.

Dr. Carr. Was the case of pyorrhea alveolaris that you cited a chronic case?

Dr. Atkinson. It had been suppurating for eight months. There was recession on the left side. The teeth were not very loose. Where the gum had receded on the three inferior incisors, there were pockets of about a quarter of an inch in depth. It was not a very bad case, but it could be demonstrated around all the teeth mentioned. It was a case of true pyorrhea ; it was not an unclean mouth.

A Member. Have you applied it in pockets at the apex of the root?

Dr. Atkinson. When filling pulpless teeth, I believe in getting room enough to work, and drill through the end of a root, and do it very freely. I do not have any trouble. Teeth that I so treated long ago have come back to me, and are found perfectly comfortable.

Dr. Carr. Would you attempt to drill all classes of teeth to the apex?

Dr. Atkinson. My purpose is to bore through to the apex of the roots of any tooth that has abscessed.

Dr. Carr. Would you drill through the apex to the buccal roots of a molar?

Dr. Atkinson. I do not say I would, nor that I could ; I would drill well up in the root, avoiding a side puncture if possible. I do not think a remnant of pulp left there will do any harm, if iodoform be placed in contact with it, and sealed in under the filling, nor would a slight puncture of the side of the root be a cause for alarm.

Dr. Geo. Evans. Is the five per cent. solution of pyrozone a coagulant of albumen?

Dr. Atkinson. I feel pretty well satisfied that it is not.

Dr. Evans. Some time ago a gentleman appeared before the New Jersey Society, and showed some extraordinary specimens of peroxide of hydrogen ; but he resorted to a very unprofessional method of selling it, and, in consequence, the medical profession has taken no interest in it. He came to my office, and had quite a little discussion with me on the subject. A medical gentleman who was present, when he found out how the matter was being managed, would have nothing to do with him. I tested the peroxide, and as far as I know there is nothing in the market to equal it. Marchand's peroxide is a nuisance to have in the house in warm weather. I had a bottle of this other peroxide last summer, and placed it on a stand near my operating-chair. I happened to go out of town, and upon my return, when I had occasion to use some of the peroxide, I found that the cork had been left loose. I use a great deal of it in treatment of abscessed teeth. Upon testing it, I found it of a strength just about equal to what it was when I opened the bottle. I kept using it until the last drop of the peroxide was gone. I have been using this make ever since. I will not give the name, because I do not think it proper for our society to encourage such a method of advertising as the manufacturer makes use of. In speaking to a gentleman, Dr. Robert T. Morris, the eminent surgeon, about it, he said there is no question but what that man has found a way to combine nascent oxygen in solution.

Dr. Meeker. I can corroborate Dr. Evans in regard to it. It is far superior in strength to Marchand's. I have it in my office, and use it probably every day. I have used it often in the warm weather. The New Jersey Society was unfortunate in having a gentleman that evening try to advertise his peroxide, but of course we could not help that.

Dr. Nash. It seems to me that without designating just what kind of peroxide it is, or who the manufacturer of it is, its recommendation is of no value whatever to the society.

Adjourned.

B. C. Nash, *Secretary*.

TWENTY-FOURTH ANNUAL UNION CONVENTION OF THE SIXTH, SEVENTH, AND EIGHTH DISTRICT DENTAL SOCIETIES OF THE STATE OF NEW YORK.

The annual convention of the Sixth, Seventh, and Eighth District Dental Societies of the State of New York met at Binghamton, Tuesday, Wednesday, and Thursday, October 25, 26, and 27, 1892. Although the number present was less than in previous years, the papers read were worthy of attention and the meetings attractive. The banquet given Wednesday evening at the Bennett House was a feature of the gathering which was especially enjoyable, not entirely on account of the palatable viands so generously provided, but because of the appropriate remarks of the toastmaster, Dr. Frank B. Darby, and of those who were called upon to respond to the toasts. Drs. French, Holmes, Barrett, and others of the dental profession, and a number of gentlemen representing literature, law, medicine, and the ministry, acceptably responded to Dr. Darby's call.

The convention was called to order Tuesday, October 25, at 4 P.M.; Dr. C. W. McCall, of Binghamton, in the chair.

After prayer by the Rev. Dr. Nicholls, the president read an address of welcome. Dr. Hayes, of the Eighth District, responded, giving in the course of his remarks a sketch of the inception and growth of the society idea in the dental profession, and the history in brief of the societies represented in the convention. He closed his remarks by thanking the president and the members for their welcome and for the admirable arrangements for the meeting.

After reading, correcting, and accepting the minutes of the last annual meeting, a paper was read by Dr. H. J. Burkhart, of Batavia, on "Education."

In his paper Dr. Burkhart advised dentists to seek opportunities to give the people, more especially children and the instructors of children, information in regard to dental hygiene. He said, "The woeful and lamentable exhibitions of ignorance encountered in every-day practice regarding the most ordinary rules for a proper observance of common laws of health, in the care of the teeth, should at once appeal to every practitioner and enlist his aid in bringing about a radical change." Among the means which he advocated to bring about this change were addresses before teachers' institutes and lectures in the public or other schools, feeling that the age when such knowledge would be most readily inculcated was the school age.

Discussion.

Dr. Stainton said that he agreed with the author as to the necessity of educating the people, and that the amount of popular ignorance about dental matters was disgusting. The opportunity of addressing a convention of teachers should not be neglected, and such opportunities should be sought, and would be by every one who was living up to his duties.

Dr. C. S. Butler said he did not know what view to take of the subject as presented. The need of popular education was too apparent to be doubted or denied, but there were many objections to the proposed way of meeting it. The giving of lectures in schools would meet with a great deal of opposition. It would be delightful to talk to a teachers' convention on dental hygiene; but there would be a suspicion that the dentist was fishing for business, and he would be perhaps counted as an advertising dentist. As he looked at it, the only place where a dentist could do missionary work as an educator of the public would be in his own office and with his own patients. The opportunity here offered should not be neglected. The dentist should thoroughly impress every patient with the sanitary and hygienic importance of the proper care of the mouth and the teeth. If this is done as it should be, the patient will in turn become a teacher, and the good work will go on. No dentist can be interfered with for work done this way, nor will he be suspected of a desire for advertising himself, or of any other motive than the laudable desire to benefit his patients. We should impress all having the care of children with the necessity of beginning early to teach them to keep their teeth clean, so that it will become a habit. A child should cleanse its teeth as regularly as it washes its face, and if taught to do so when it is young it will continue the practice. If we can teach parents the necessity for this, the teeth of future generations will require treatment much less than do those of the present day.

Dr. F. A. Lee said there should be a pamphlet prepared which the dentists could furnish to their patients to teach them the necessary facts about the care of the teeth. Such a pamphlet would do more good than simply telling the patients, as it would be taken home and looked over at leisure, and be placed before other members of the family.

Dr. W. C. Hayes spoke of the prevalent mistake many people make in considering the sixth-year molar a deciduous tooth, and therefore of little value. He thought a pamphlet such as Dr. Lee advised would be useful, but that it should emanate from a society and not from the individual.

Dr. Butler said that the American Dental Association had formulated a series of ten questions which they desire societies throughout the country to take up and discuss, and have a digest of papers and discussions forwarded to the committee in time for a report to be made at the next meeting of the American Dental Association, at Chicago next year. He thought that the question of the education of the masses was one of the ten.

Any good work done in this line would be elevating to the profession and the people as well; but it must have the authority of the profession, and not bear the name, office hours, and address of the individual dentist, or it will have the flavor of advertising, and be objectionable on that account.

On motion, the subject was passed, and the convention adjourned to 8 P.M.

FIRST DAY—*Evening Session.*

The convention was called to order at 8 P.M., Dr. C. W. McCall in the chair.

Dr. S. B. Palmer read a paper entitled "Anchorage of Gold Fillings," which will be found on page 972 of the current number.

Discussion.

Dr. A. M. Holmes said he had been using Canada balsam for several years as recommended in the paper, and considered it very valuable for the purpose of retaining fillings and preventing thermal shock to the pulp. He described a method of using Canada balsam with gutta-percha fillings, in which he, having first evaporated the solvent from the balsam, moistened it with chloroform, then lined the cavity with the solution and filled with gutta-percha, finishing the filling with tape moistened with chloroform. This makes a filling which will not leak, and the gutta-percha will be held so fast to the cavity that it cannot be pried off, but will be pulled to pieces before it will leave the tooth. He had used gutta-percha in this way under amalgam fillings for the prevention of pain from the changes in temperature. In the case of an incisor where the front part of the tooth is broken away so that there is no chance for anchorage except on the bottom of the cavity, he uses Williams's crystal gold to begin with, and finishes with crystal gold. Where the walls of the cavity are strong enough to warrant it, he uses soft foil for filling, as it takes less time and will not leak. The best way for each individual dentist will depend upon his knowledge and expertness with the different grades of gold. Some cannot use soft foil, but if they will learn to they will do better work in less time, with less fatigue to both operator and patient.

Dr. F. W. Low said he would bring out a point in anchorage for gold fillings by calling on Dr. Stainton to tell of his experience with soft oxyphosphate.

Dr. C. W. Stainton said that at a meeting at Buffalo last fall, a gentleman had told of filling an incisor where he had built up the corner with gold. The filling afterward came out, and he had replaced it and stuck it in with soft oxyphosphate cement. The speaker tried the same thing, and had been very successful in several cases,—in at least a dozen cases where there was no retentive shape to hold the filling. The oxyphosphate holds the gold, and the gold protects the oxyphosphate from dissolving.

Dr. Palmer said that he used the soft oxyphosphate with fillings that have fallen out, and it succeeds both with amalgam and gold; he uses it also as a lining of cavities.

Dr. Darby said that upon Dr. Palmer's suggestion, years ago, he had tried this plan upon a patient, but the filling came out. He tried it several times, and somehow just about then more of his fillings came out than ever before; he had the record of ten, every one of which failed.

Dr. Palmer said that when a filling came out it should be thoroughly cleaned, as well as the cavity. Every part of the filling should be made bright; then having mixed the oxyphosphate to the consistence of cream, line the cavity with it, and also touch the gold with it, covering that part which is inside the cavity. Press it to place, and hold it firmly till the cement sets. If this course is followed, good results are to be expected.

Dr. M. D. Jewell was inclined to think that only in exceptional cavities oxyphosphate or sandarac varnish would prove adequate as anchorage for gold or other fillings.

Dr. Stainton said that he was glad that Dr. Darby had had the failures which he mentioned, as he did not wish to be responsible for any one's going into this style of anchorage, but thought perhaps if Dr. Darby's cavities and fillings had been thoroughly cleansed of all grease and particles of food before the fillings were replaced, that he would have succeeded in making them stay in.

Dr. Darby asked if chloroform would clean the gold.

Dr. Stainton said he thought so. It did in his cases.

Dr. Darby asked if in filling with gold over oxyphosphate the cement remained soft till the gold was condensed.

Dr. Lee said he had had good success with crystal gold over oxyphosphate.

Dr. Darby said he always regretted to hear men whom the profession holds in esteem advocate such practices as the use of Canada balsam as anchorage for fillings, because it does not seem to be good mechanics, and should be recommended with great care, for it is possible some will follow the practice to the exclusion of more careful and reasonable methods. It will, or may be, as it was with copper amalgam: many of us feared it till the statement was made that Dr. Miller had pronounced it the *ne plus ultra* of filling-materials, then we felt safe to follow where so great a man led, till we can all agree that no one thing has done so much harm in dental practice as copper amalgam.

Dr. Palmer said he would be sorry if he could not be re-heard, so as to set the discussion right. His first point was to use the balsam to line the cavity to protect the dentine from electro-chemical action, and guard against the effect of thermal shock to the pulp; the other point gained by the use of the balsam was to guard against the entrance of moisture around the filling.

On motion, the subject was passed.

Dr. E. D. Downs read a paper entitled,

Gleanings from the Journals,

of which the following is an abstract:

The essayist explained as his reason for presenting a paper of this character that, in his experience in arranging programs for his district society, the chief difficulty in obtaining essayists grew out of the idea which many of its members seemed to hold: that they must write something elaborate, scientific, and new, in order that it should be acceptable. This view he held to be erroneous, in the case of local societies at least; and while it might apply to the national association, which was the recognized leader of dental thought in this country, he said, We must remember that our societies are graded, and the ponderous thought of a society which gathers its members from the whole country would be out of place in one whose membership is confined to a few counties, and is composed largely of young men. The object of our annually meeting together is not simply to listen to papers, but to compare experiences, modestly stating our successes and frankly confessing our failures, getting in keener touch with our fellows, to go home with renewed ambition to make better dentists of ourselves. While dentistry must make its advance to a liberal profession through the channels of original research and scientific knowledge, yet its daily work is full of laborious details, whose difficulties are solved by the ingenious rather than the scientific mind. It often occurs to me, as I suppose it has to others, when reading a dental journal, that I would like to talk its contents over with some one. Moreover, I often see a suggestion that I try, and find it in my hands a success or a failure. When a failure, I do not always know whether the fault lies in me or the method, and would like to hear the experience of some one else. Or some things which I think I will try, slip from my mind before the opportunity occurs; but some one else may have tried them, and be able to approve or condemn them, for all ideas must stand the test of clinical experience to have their value proven. Therefore, it has seemed to me that a paper of this character should be written every year by some member and discussed by all,—having virtually before us the literature of the year as a part of our program; and while the essayist will present but a small part of it, others will add to it, and possibly we will all read our journals better, and put their teachings more into daily practice.

It is not my intention to give you a synopsis of even one dental journal, and I shall only attempt to call your attention to a few of the things that have remained in my mind from the year's reading, confining myself mostly to practical subjects, as follows:

Disinfection of Instruments.

While others have spoken words of value, Miller has covered the ground most effectually in an article in the July, 1891, Dental Cosmos, and also in his work on "Micro-Organisms of the Human Mouth." If any one has failed to read his article in the journal mentioned, he should do so at once, and those who have read it should re-read it until its teachings are firmly impressed upon the mind. I find it hard not to quote it entire, but a few quotations and a statement of his results must suffice us here. He says, "It is true that there are still some whose appreciation of their duty toward those who commit themselves to their care is so stunted that they insist upon the right to spread infection by unclean instruments or fingers that are not absolutely free from germs. Fortunately such men are rapidly becoming fewer, and will not be able to hold out long against the just condemnation of an advancing profession."

He adds later, "We cannot even touch any point in the oral cavity without our instruments becoming coated with a layer of infectious material."

For cleaning rubber-dam, he says the only safe way is boiling for fifteen minutes. Personally, it is a number of years since I washed and again used a piece of rubber-dam.

I shall have to refer you to his article for details of his experiments, but his results certainly were surprising. Even concentrated carbolic acid failed to sterilize instruments, after an exposure ranging in some cases as high as twelve minutes. He did find that an exposure of from fifteen to twenty minutes in a five per cent. solution of bichloride of mercury could be depended upon in all but exceptional cases.

Letting alone the risk of injury to instruments, the time required even with this solution is a serious one. But boiling all small instruments, such as are in use in our operating-rooms, for three minutes, was found sufficient (forceps require five). The addition of soda prevents rusting.

If you will only make proper arrangements, this becomes the easiest, as well as the quickest and most effective, means of sterilization of our instruments.

Copper Amalgam.

Last year Dr. Nelson gave us an interesting paper on copper amalgam. But I fear most of us have found its tendency to waste so great that we have been obliged to almost abandon it. Yet I still find that in teeth with a tendency to rapid decay, and recurrence upon the buccal faces of molars, it seems to be of value. In such teeth, in such places, I have not found it usually wasting, and occasionally use it, and would not wish to leave it out of my case.

Another use I have made of it is in regulating cases. When I desired to fit apparatus to teeth in a way that had a tendency to mar plaster, I have made parts of the cast of this material. It will bear light swaging, can be used in modeling compound impressions, and can be used over and over again, so that a small quantity kept for this purpose will suffice a man for a lifetime.

Copper in Regulating Cases.

Dr. V. H. Jackson presents this in a valuable article in the December, 1891, DENTAL COSMOS, where many simple and inexpensive apparatuses are illustrated. I have used copper in a few cases, and have found, as he says, food does not decompose under it. I do not know whether the rest of you have noticed it, but I have, that occasionally teeth have whitened from incipient disintegration under regulating appliances. I do not believe that they do when copper is used, and it is asserted that it has been used in connection with clasps on artificial dentures, and has seemed to prevent the destructive action of the clasp upon the teeth.

Mat Gold.

The opinions on this material vary, as they do on nearly everything we use. A few cases have come to my knowledge where it failed to give satisfaction, and in those of which I have had direct knowledge it has appeared to me that too large pieces have been used. A dentist usually buys one single package of this for trial, and quite likely the very first case he gets he tries it, regardless of whether the pieces he has are of appropriate size or not. It should be used in such size pieces as can easily be carried to place, packing it first with rather broad-faced pluggers with shallow serrations, condensing with finer points. It is one of the rapid-working golds, and I think all such golds must be used with care; but properly used, and in appropriate places, nothing in the form of gold has given me more satisfaction.

In the fall of 1891 I used considerable of it in heavy contour work. Many of the fillings then done have been constantly under observation. They seem hard, are free from pits, retain their bright polish, resist mastication, and up to the present time are satisfactory in every respect. I do not use this gold for everything, any more than I use gold only for everything, but I do use it in a very large percentage of cases.

It is very cohesive, yet soft and easily worked, and I think makes contour work possible to operators even of moderate skill.

I really don't like that last expression, for in my experience the contouring of a tooth is not nearly so difficult as the proper protection of the walls, but the quality of cohesiveness is necessary. I might add that I have used this gold with hand pressure and with the automatic and electric mallets, giving great satisfaction with the latter, which from its form I feared at first it might not.

Devitalization of Pulp.

As familiar as we all are with this subject, it occasionally presents difficulties. One of the valuable features of our last union meeting was the papers and discussions regarding it, all of which have since been published in the DENTAL COSMOS, and in the *Dental Practitioner*, of Buffalo.

Dr. McCall's paper on the use of cocaine for this purpose induced me to test it in practice. After my first case, I moistened the crystals with carbolic acid, and I have found that with care and with little time I have been able to remove pulps, causing no more pain than in the preparation of a somewhat sensitive tooth for filling.

Methods of Root-Filling.

This is an old subject that crops up periodically, and while present methods seem satisfactory in most cases, yet it is one we shall probably continue to discuss as long as we have pulpless teeth to treat.

It is my desire to call your attention to an article by Dr. Joseph Head, now assistant editor of the *International Dental Journal*, read before the Odontological Society of Pennsylvania, and published in that journal among the society's proceedings in May, 1889. I am unacquainted with any who are following the practice advocated, although it seemed to me then, and has since, that the method there taught was backed up with such tests as to make it worthy of clinical trial and comparison. Any digest I can here make will not do his paper justice, but I would refer any one interested to his paper and the discussion in the May, 1889, *International Dental Journal*, and the sequel to the discussion in the next number of the same journal. I will quote briefly his words to describe his method : "Put on the rubber-dam, remove dressings, and blow hot air into the tooth until it becomes painful ; then, using a hypodermic syringe filled with warm carbolized cosmoline, pump the canals full.

"In dealing with the large canals this will be an easy process. In those of a small diameter the passage of the cosmoline to the apex will be aided not only by capillary attraction, but also by the contraction of the cooling air. By finally pressing a pellet of cotton soaked in cosmoline over the small orifice, and then inserting a minute shred of cotton wherever possible, it seems reasonable to suppose that the canal can be filled to the apical foramen with an antiseptic substance sufficiently viscid to exclude moisture from without. Cotton should then be packed in the large canals to act as a support for the medicament.

"The canals should be filled with cotton to the pulp-chamber, and a small pellet soaked in cosmoline placed over the orifices of those which are too small to allow the entrance of a thread. The cavity should now be washed with chloroform to remove superfluous grease, and the pulp-chamber filled with gutta-percha or cement. I connect the mouths of the canals with protected cotton in order to expedite venting, should it be necessary. This is merely my personal preference. It is not essential. The filling to be used in covering the contents of the pulp-chamber of course must vary according to the individual peculiarities of the tooth."

Dr. Head presented with his paper glass tubes filled with cement, gutta-percha, and by his method, which had been tested in aniline ink. All showed leakage except his own. His tubes were objected to, and it was suggested that he draw them to a fine point, file off the point, fill, and he would get different results. At the next meeting he presented not glass tubes, but natural teeth, filled under favorable conditions outside of the mouth. These had been tested as before, and the results were the same. I have never filled a root in the manner he advocates, although I have used to a limited extent and with much satisfaction a paste recommended by Dr. Van Woert, of Brooklyn, consisting of iodol, oxide of zinc, and cosmoline ; but the article has always been in my mind, and some things in my clinical experience have seemed to support the assertions of the essayist.

In removing root-filling of either cement or gutta-percha, I have noticed the odor, and although most of these teeth had given no trouble, and were crowned without any further medication, in some cases, than saturation at the moment with an antiseptic, and have continued to give no trouble, yet it has made me question the desirability of these materials for this purpose, providing something better could be obtained.

I abandoned my practice rather suddenly once, for six months, on account of a surgical operation. At that time I had many teeth under treatment which it was impossible for me to fill. These teeth were stopped with marine lint dipped in a paste of iodoform and vaseline, the root previously having had some of the paste worked into it. The patients were advised to consult others, but many of them awaited my return ; and although this was in the fall of 1887, some of those roots have been only recently opened to receive more permanent fillings, for these were only intended as dressings, and have been filled without giving subsequent trouble.

The discussion of the paper seemed to turn on the use of cotton, and not sufficient allowance seemed to me to be made for the different conditions under which it was used. The roots having been first saturated or filled with carbolized cosmoline, the cotton saturated with the same was a convenient material for filling the large space, and was, in fact, a vehicle to carry and keep it there. Moreover, it was a filling that could be easily removed in case of subsequent trouble. I know many will reply that, if the work had been thoroughly done in the first place, retreat would not have been necessary ; but whether a necessity or not, other things being equal, cotton is not a bad thing to have.

What are the objections to cotton? Is not the principal one the danger of its absorbing moisture and breeding dangerous gases? Do gutta-percha and the cements absorb moisture and allow the formation of gases? If so, what are their advantages?

But if cotton can be maintained in an aseptic, non-absorbent condition, would it not have advantages as a root-filling?

Do not understand me as advocating cotton, for I have never used it except as a vehicle, and that mostly in oxychloride fillings ; and even if I were to fill roots as suggested, I should probably use marine lint instead, believing it to possess some advantages over cotton. It is a lint saturated with tar, and used quite extensively in surgical dressings.

The question now naturally arises, Does Dr. Head's method of using cotton prevent absorption of moisture, and thus maintain pulpless teeth in a healthy condition? The only personal experience I have to offer is to repeat what I said a few moments since, *i.e.*, marine lint with iodoform paste has kept pulpless teeth from giving trouble for years when covered with gutta-percha, although not packed with any such intention, and the covering filling not done with the care that should have been given had they been expected to do the service they did.

Cosmoline is calculated, I believe, to resist and prevent moisture entering pulp-canals.

Cosmoline united with an antiseptic is calculated to prevent moisture entering a root and preserve it in an aseptic condition, if once made so.

If this is true, have we not a use for such materials for root-fillings?

Personally, I use gutta-percha almost exclusively for this purpose, and with such perfect satisfaction, so far as subsequent trouble and ease in working are concerned, that I certainly shall continue to do so for the present in the larger roots. But there is a class of roots so small and so difficult of access that I do not feel sure that I have filled them, and here is where this method seems applicable. The ability to take an easily melted preparation and inject it into these roots appeals to me strongly.

Argenti Nitras.

In the *International Dental Journal* for October, 1891, appears a paper entitled "Argenti Nitras as a Therapeutic Agent in Dentistry," by Dr. E. A. Stebbins.

With wooden points and the mouth protected, he paints the cavities in certain cases without removal of decay, and in a large percentage no recurrence takes place. This treatment is particularly applicable to small sensitive cavities on the buccal and labial faces of teeth, and to stop the progress of decay in the deciduous teeth. Of course its resulting color is objectionable, and it cannot be used when the decay has reached the live pulp, as it will cause pain.

It might be well to mention that he rubs a little amalgam or silver filings over the decay to take up the free nitric acid, and washes the mouth freely after the use of the remedy. My own experience with it is too limited to express an opinion founded on observation; but I do believe it is the proper treatment for the deciduous teeth, and will give our little patients and ourselves an amount of comfort that every dentist can appreciate.

I will leave the paper with you at this point for discussion. You will all recognize that many of the very good things that have been printed are not recorded here; also that I have touched but lightly upon most of the subjects.

But you must remember that the paper has been written as an experiment. If it meets with your approval, if bringing before you thus second-handed a portion of the literature of the year for the purposes of discussion and comparison of experiences, seems to you to add to the interest of our district meeting, then let us have some one repeat the effort each year, only with more careful preparation.

Discussion.

Dr. F. W. Low said he heartily approved of Dr. Downs's paper, and thought such a one should be prepared for every annual meeting of a society. In regard to the sterilization of instruments, he thought that the baking process was the best, but it was too slow. His practice was to wash all instruments in boiling water. He had used iodol and cosmoline in filling pulp-canals, but found it discolored the tooth, and therefore he discontinued the practice. The extirpation of pulps with cocaine he had found was followed by excessive hemorrhage, so he resumed the old practice with arsenious acid. He had followed the recommendation of Dr. Bödecker in the October DENTAL COSMOS. The process is to devitalize the coronal portion of the pulp with cobalt. The result of the treatment in his hands had been a very severe toothache for about three hours; after this the coronal portion of the pulp was dissected away by means of a sharp bur, and the cavity washed out with one-tenth per cent. solution of corrosive sublimate, then tin was burnished into the cavity and coated with wax, and an amalgam filling put in. The coating of wax is to prevent the mercury of the amalgam from combining with the tin, and thus destroying the efficiency of the cap. The advantage claimed is that the dentine is nourished by the stump of the nerve left in the pulp-canals.

Dr. W. A. Barrows spoke in condemnation of copper amalgam.

Dr. Darby said that, though much had been said against copper amalgam, yet it was true in his practice it filled cavities and arrested decay.

Dr. Low said that he did not believe it was possible to destroy part of the pulp, remove the destroyed portion, and leave the remainder alive.

Dr. Holmes said of copper amalgam : When it became brown or black, it was a good filling ; when it remained bright, it almost invariably washed out. It depended altogether upon the manipulation, and when it failed it was because it was used too dry. It should be used with an excess of mercury, and to mix in a little precipitated silver improves it.

Dr. Downs said that he had intended to throw out that part of his paper referring to copper amalgam, as he thought more than enough had been written and said about the subject already. Excessive hemorrhage from an extracted pulp can be controlled by the use of peroxide of hydrogen or with hot water.

Subject passed.

(To be continued.)

AMERICAN DENTAL ASSOCIATION.

(Continued from page 930.)

SECOND DAY—*Evening Session.*

THE association was called to order at 8 P.M., President Walker in the chair.

The Committee on the President's Address offered their report, which was read by Dr. Shepard, as previously reported in the September issue of the DENTAL COSMOS, page 754.

The resignation of Dr. F. M. Odell as a member of the association was received and accepted. On motion, Dr. Odell's dues for the current year were remitted, and the secretary was directed to forward him a message of sympathy in his broken health.

Section III, Operative Dentistry, was called, and Dr. A. W. McCandless, the secretary of the section, read the report, an abstract of which follows :

The report catalogues some sixty articles relating to operative dentistry which have appeared in the dental journals during the past year. The notable feature of these papers is that but one is on the subject of capping exposed pulps. The observation of the author of the report is that the writers who choose this subject are usually young men in the profession, the older members having less and less to say upon it the longer they are in practice.

The DENTAL COSMOS this year gives us a new designation for the grinding-surfaces of the teeth, in "morsal." No new work on operative dentistry has been published during the year. Catching's "Compendium" is an annual and welcome visitor to the busy practitioner.

Dr. Crouse, the chairman of the Executive Committee of the association, has made a strong effort to bring the state and local societies into closer relation and affiliation with this association, by asking their secretaries to send him reports of their proceedings, if they afforded anything of interest or importance to the profession. Some twenty-five replies have been received, giving in some instances a fairly good synopsis of the proceedings ; but the majority have failed to grasp the idea, and have simply sent in a list of the subjects of papers, the names of authors, and of officers elected. However, a start has been made in the right direction, and there is reason to hope that more thought will be given to the idea during the next year. A few papers of some merit have been read on the direct application of pulps to facilitate their painless removal. Further experiments in this line will doubtless result beneficially.

The new and improved appliances and materials brought to the notice of the section are : Dr. Ames's oxyphosphate of copper cement ; Crystal Mat gold ; Dr. Keep's cervical clamp, lately improved ; improved finger sponge-holder, Flexo separating files, binding wire, Johnson's cervix clamp, dento-electric cautery, Dr. How's heater for softening gutta-percha, modification of the Kells bracket-arm for dental engines, Flexo files for saw-frame, improved root-drier, cotton-pellet roller, root-trimmers, the Bosworth universal mallet, silver-and-platinum alloy screw-posts, and Dunn's hand-matrix for manipulating plastic fillings, especially large contour amalgam fillings, and for restoring interdental spaces. Dr. Dunn has an original method of gaining space between teeth by the use of floss silk and cotton.

The report also announced two papers, on "Replanting and Transplanting Teeth," by Dr. Morrison ; and "Matrices," by Dr. Cravens.

The report was accepted, on motion of Dr. Peirce.

Dr. W. N. Morrison, of St. Louis, read a paper entitled "Replanting and Transplanting Teeth." An abstract follows :

Of the cases reported to this association in 1875–76, two replanted teeth are still in the mouths in fairly good condition. Of these, Mrs. B. was constitutionally the most unfavorable subject that could be selected, while the majority of the others were favorable subjects ; yet the teeth dropped out in a few years, with their roots resorbed. In many cases the sockets were not favorable for the repetition of the operation, or the patients refused to submit to it again.

The manner in which these operations are regarded by the profession at large makes it exceedingly uncomfortable for an individual who does plant teeth ; in support of which he instanced the case of a lady, the daughter of a physician, for whom, in April, 1892, after much persuasion, he performed a second implantation of a left superior bicuspid, its predecessor having been implanted in November, 1887. For three weeks following the operation she had all manner of unfavorable symptoms : erysipelas, blood-poisoning, fever, loss of appetite and sleep, etc. If she had died or become seriously ill from any other complication at that time, he would have been held accountable to the law for performing an operation not indorsed by the profession.

The paper continued with a report of six cases of successful transplantation and implantation, most of the teeth used in the latter operation being dry specimens. One of these was to replace a left superior lateral previously planted by a neighboring dentist, a portion of the crown of which became broken off, with a fracture of the root one-eighth or three-sixteenths of an inch under the gum, the remainder of the root being firm and healthy. A gold crown was then adapted and worn a few months, when the remainder of the implanted crown came away. The root was then drilled out and another dry tooth implanted, which has done several years' comfortable and satisfactory work. In another case, a gentleman aged thirty years, the permanent left superior cuspid had never erupted. It finally appeared near enough to the surface, and was cut down for and extracted from a horizontal position in the roof of the mouth, just inside the bicuspids, with the point near the central. It was in good condition, and was large and well formed, except a crook near the end of the root. The deciduous cuspid was extracted, the socket prepared, and the permanent tooth planted. A third case was a right upper first molar with three distinct roots, planted Nov. 2, 1891, which healed by first intention and never gave a moment's uneasiness.

One would think, from listening to the papers and discussions at dental meetings, that the preserving of teeth was plain sailing. A little gold tapped in, and the tooth was secure for all time. But somebody extracts teeth and roots right along from the mouths of the higher order of patients. The slaughter-houses are not alone responsible for the toothless specimens seen.

It has been his practice for years to transplant teeth in all sockets having good alveolar process. Where he removes a root or two, the process is always tolerant. With him it is an indispensable operation, which has been made much more convenient since Dr. Younger demonstrated the use of dry teeth, though the more nearly fresh the specimen is the better it suits the writer. Security in position and entire rest are of absolute importance. These he secures with a figure-of-eight copper-wire ligature from the crowns of adjoining teeth over (or under, as the case may be) the cutting-edge of the planted tooth, the ligature being secured with phosphate cement, and the fixture worn for six or eight weeks.

Dr. W. H. Morgan, Nashville. Did you take out the pulp of the replanted cuspid?

Dr. Morrison replied that he always removed the pulp and filled the canal, and he always cut the socket to fit the root, a step which he considered indispensable to the success of the operation.

A paper of Dr. Junius E. Cravens, of Indianapolis, entitled "Matrices,"* was read by Dr. Geo. Edwin Hunt.

Dr. Joseph Head, Philadelphia, asked Dr. Morrison how many of his cases of implantation had lasted five years.

Dr. Morrison replied, not to exceed twenty per cent., at a rough guess.

Dr. J. A. Swasey, Chicago, considered twenty per cent. a small average of successes for those who practice implantation. When listening to the paper on "Matrices," the one thing that had struck him was that he didn't want anything malleable except gold in approximal cavities. What is wanted is something that you can hammer on to like a wall or a piece of brass. He does not believe many dentists fill cavities with "obscure walls." For himself, he did not quite understand the term. He certainly should not attempt to fill a cavity unless he could see all portions of it. The writer of the paper also said that it was not necessary to separate the teeth for the adjustment of the matrices, but it is a fact that food can collect in any space in which you can run a paper disk. The use of the matrices has been a boon to many dentists, but in his opinion it has not been a boon to the man who likes to fill teeth right,—that is, its indiscriminate use. The secret of the adjustment of the matrix is to so place it that the operator feels that with its aid and the rubber-dam properly adjusted he has a simple cavity to fill.

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* See page 984, current issue Dental Cosmos.

Dr. H. J. McKellops, St. Louis, considered the matrix an important appliance, and that Dr. Jack did an important service when he first brought it out. The speaker used Jack's matrices and a great many others in filling approximal cavities. The advantage of their use is that you get plenty of room, so that you can see, and they also help to shape the filling. It is his practice to bevel the edges of the cavity so that he can see all the edges, and when the matrices are there the edges of the filling will be perfect. He separates the teeth with jack-screws or Perry separators, and holds them firmly in position with the rubber-dam on. If the work is properly done, there is no pain to the patient. To do away with the matrices would cause pain and suffering in many cases, and to his view it is the duty of the dentist to study how much he can minister to the comfort of the patient. In putting on the matrix it frequently occurs that at the gingival margin it will stand a little open, and it is desirable to use something to hold it firmly in place. All that is necessary is to shape a little piece of orange-wood in the form of a wedge and put it in, and the gap will be closed perfectly. He will apply the matrix and let it remain for one or two or even three hours, without even hurting the patient. He could see no advantage in having a band around the teeth, as in some forms of matrices, because it is necessary to see as much as possible, and the presence of a band must interfere more or less. In his opinion, matrices are an excellent thing. As to the transplantation of teeth, all of us have seen examples of the results which follow such operations. He had seen many of the operations of Dr. Younger, a good many of which were flat failures. Some implanted teeth last five or six or seven years, but that is about all that can be hoped for the best of them. He is not in favor of extracting teeth, as a rule, but he does extract where it is necessary, and he has seen work from the hands of people who do not extract which would make their cheeks burn if it were shown here.

Dr. J. Taft, Cincinnati. The matrix is a small matter, but a very important one. There is quite a diversity of opinion in regard to the value of the matrix, and a great variety of appliances of the kind known as matrices have been suggested. Dr. Jack's matrices were brought out many years ago, and they are very good. They are properly made of steel, with the side toward the cavity cupped or concaved. Thin pieces of steel or other metal placed between the teeth are also used as matrices. There is also the band matrix, which is made in a great variety of ways. The German-silver band matrix referred to was first suggested by Dr. Herbst several years ago. It is a very good method for making a simple appliance. Much faulty work, however, follows the use of the matrix. It is impossible to make a perfect adaptation and finish of the gold at the cervical margins with the matrix in position. Those who use matrices would do well to have all the different forms at hand, for the reason that some would be better for this cavity, others for that. One form which has not yet been spoken of is the partial matrix, which only comes up a little way on the cavity. With the use of such a matrix, the cervical margins can be filled without difficulty. Then, after that portion of the cavity is filled, the matrix may be removed and the remaining portion of the filling put in without the matrix. A good filling may be made in that way, where, with the full matrix remaining until the work was complete, the cervical border might be defective. In many instances the partial matrix is found much better than the band or the ordinary form.

Dr. E. T. Darby, Philadelphia. The query which was propounded to the writer of the paper on replantation, as to the permanency of the operation, and the reply which he made, were of such a nature as lead one to suppose that such operations were only useful for a short time, an idea which he thinks should be corrected. He does not mean to imply that an implanted tooth is a permanent operation; but he has seen many which have been in position for six or seven years, and are doing good service to-day. One case which he recalls at the moment was that of a lady who went to San Francisco and had six teeth—four bicuspids and two central incisors—implanted by Dr. Younger. All of them remained six years; then one central failed, in consequence of absorption of the root, and was extracted. He advised her to have another tooth implanted in its place. She consented, and the socket was allowed to fill up, a small plate with one tooth on it being worn in the mean time. Some months later he bored a new socket, going deep down to reach a denser portion of the bone, and implanted a tooth, somewhat carefully selected, in the socket thus formed. That tooth soon became firm, and continues so to-day. He is of the opinion that the majority of implanted teeth will fail through absorption; but if some of them remain six years, and others can then be implanted in their places, the operation cannot be pronounced a failure. We do not always distinguish the fact that the means by which implanted teeth are retained in position are of two kinds. In some there is unquestionably a bony ankylosis, and he thinks that these cases may be fairly regarded as permanent. Since the operation was introduced he has implanted thirty-six teeth, only six of which have failed so far as he knows, and in almost all of the others he himself could not tell them from the other teeth in the mouths if he did not know that they were implanted. There are places where implantation is an invaluable operation; for instance, in the case of a central or lateral incisor which has been crowned, and the root become split or from some other cause worthless. In many instances teeth so implanted will remain four or five years, and if lost others can be implanted, because, in the event of failure, there is as good tissue as before to implant another tooth.

Dr. W. H. Morgan, Nashville, Tenn., while he agreed with most that had been said in the discussion, could not allow some of the statements which had been put forth to go unchallenged. His first criticism is as to what Dr. Darby had said about bony ankylosis. As he understands it, there is no such thing as a bony ankylosis. We have ankylosis of the joints; but it is the uniting of the cartilage, not of the bones. As to the method by which an implanted tooth is held in its socket, he is of the opinion that it is simply encysted by a growth of cartilage or some fibrous structure which penetrates to the canaliculi, and so holds it in place. There is no bony union. The dead and the living do not unite. Two of the speakers have asserted that a tooth cannot be properly filled unless the operator can see every portion of the cavity. In contradiction to that statement, he would say that he was satisfied that some of the best work he had ever done was in cavities where he could see only a portion of them. To be sure, he used a mirror to see that the cavity was properly shaped. Cavities which cannot be made visible in all their parts are not of uncommon occurrence, as in the posterior surfaces of the lower molars. In such cases he would start the filling with a cylinder of non-cohesive or so-called soft gold, and then with a right-angled instrument fold into that a ribbon of gold until it was thoroughly compact and the space filled, the facts being tested by the sense of touch. In finishing, he again uses the glass. He has been filling cavities of this description in that way for nearly fifty years, and he knows that he is successful from the results which follow. He fills many cavities where the eye cannot see to the bottom of the cavity, and that they are successful is shown by the lasting use of the teeth after they are so filled. That there might be no misunderstanding as to his position, he wished to state that, while he has used cohesive gold almost from its first introduction, he still continues to use quite a large proportion of non-cohesive.

Dr. McKellops would ask the gentleman, What is pure gold? If pure, masses of it will adhere to other masses when placed together. No matter how it is made, it cannot help welding under such circumstances if it is pure. So far as seeing into the cavity is concerned, the gentleman has misconstrued what was said. Of course you can use a mirror and fill cavities that are inaccessible to direct vision ; but you cannot prepare a cavity in the posterior portion of a lower molar, for instance, and fill it as successfully as you can if you cut away the tooth-substance so that you can see all parts of the cavity directly. He would go any distance to see such an operation, as he was satisfied that a tooth so filled, when extracted, would be found to be imperfectly filled. Of course you can fill a cavity on the side of the tooth in that way ; but if it is on the posterior portion, it takes a very good man to make a perfect filling.

Dr. Morgan replied, "That is what I claim to be, and that is what I claim to do." He does not claim that such a filling as he had described was perfect ; but he does claim that it does preserve the tooth, and that makes it in one sense perfect. Preserving the tooth is all that can be done by any filling. If the gentleman will come to his office, he shall see numbers of specimens of fillings put in in the way he had described.

Dr. Louis Ottofy, Chicago, was delighted to hear the remarks made by Dr. Darby on implantation. For himself, he was as much of an enthusiast over the operation as he ever was. The first introduction of Dr. Younger's idea in the East was unfortunate in that Younger was obliged to implant teeth, in the operations which he performed before the various societies, in all kinds of mouths, many of which were totally unfit for the operation, and as a matter of course the teeth failed in them. There is no question that in Dr. Younger's private practice the results were far different. One point which experience in this operation has demonstrated to him is that there are few perfect roots with natural crowns. In many of them the enamel is checked, and in the course of time chips off above the alveolar process, causing irritation and eventually loss of the tooth. His practice now is to cut the natural crown off of the tooth he proposes to implant, and attach to the root with gold a Logan crown before implanting it. Another advantage gained by this procedure is that the tooth can readily be altered if desired. He has successful cases in his practice now more than four years old, and to his mind there is no more beautiful operation in dentistry than a successfully implanted tooth. Nearly all his first implantation operations failed. Many of them were performed in mouths which were not fit; but there has been hardly a case of his own choice which is not in good condition now. Probably the most of these will last for from four to seven years, and then he can insert other teeth in their places. It is an especially useful operation in those cases where the roots of the natural teeth are unfit for crowning and have to be extracted. The socket can readily be enlarged, almost without pain, and a proper tooth implanted in the vacant place.

Dr. V. H. Jackson, New York, wished that Dr. Allport would give his experience in the use of soft gold, as many of the younger practitioners would be benefited by it. They are now inclined to use soft gold again, and it would be well to put them in line to study out its advantages.

Dr. W. W. Allport, Chicago. The perfect filling would be like molten gold run into the cavity; it would fit every part perfectly. Such a filling was never put in by mortal man. A saving filling is what we want, and is what we endeavor to produce. As to soft gold, or what is frequently called non-cohesive gold, and cohesive gold: the relative value between the two kinds depends upon the conditions under which they are to be used. Cohesive gold is good under some circumstances, non-cohesive under some others. Neither of them will perfectly take the place of the other. He would feel that he could not do his duty by his patients if he left either of them out of his practice. He wants both to be available under the proper circumstances, each for its use. The history of the development of dental operations shows the relative value of these two preparations. Forty-seven or forty-eight years ago only one kind of gold was known to dentists, the non-cohesive or soft gold, and it was seldom that teeth filled by good operators at that time became discolored around the filling. The filling was frequently soft, but the tooth retained its color. The principal trouble was that sometimes a portion of the filling was lost. Remembering that the filling was composed of leaves or cylinders which were put in by the wedging process, the different portions being held together mechanically, it is not strange that sometimes a piece should become loosened and fall out, leaving the remainder in good condition. He has many times repaired fillings in this condition. Something was needed to finish up the filling and prevent pieces of it from falling off. In response to this need, there came first what was called crystal or sponge gold, which was cohesive, and so was found very useful when placed over a filling of non-cohesive gold. This form of gold was accordingly lauded as the thing, but it was very soon found that teeth filled with crystal gold turned blue. At first it was thought that the crystal gold was impure, but that was not so, the fault being that the filling leaked around it; it did not fit the cavity. The fillings of crystal gold did not fit the cavities as the older fillings of soft gold did. Then came cohesive gold foil, which was at first used with about the same results as the sponge gold. That good fillings have been and can be made with cohesive gold no one can question; but leakage around them is too frequent to justify its exclusive use. No fillings ever put in by any man surpassed these old ones. We find fillings better finished, but none which fit the cavity better. The trouble is that we have lost the old way of operating. The speaker has filled hundreds of teeth without seeing the cavities only when he was preparing them, and he was very sure that he could do with the hand-pluggers what could not be done with the mallet. You could get around corners where you could not see. The proof is that there are plenty of these old fillings that have been in the mouth thirty or forty years which are good to-day, giving their wearers comfort and satisfaction. One strong point in their favor was and is that so much tooth-structure does not have to be sacrificed, as in many of the cases which are now filled with cohesive gold and the mallet. Operators who are not familiar with this old way of operating have lost more than they can imagine. The colleges attempt in some instances to teach both methods, but the differences are so great that the students, as a rule, do not acquire the thorough knowledge they should have. The old way of using soft gold was to crowd cylinders against the walls, and then gradually close up to the center. With cohesive gold you must drive the first pieces down to the floor of the cavity, and the tendency of every stroke of the mallet is to draw the gold away from the wall. The only way to avoid this is to make the center higher than the other portions of the filling, and work from the center to the wall. In the use of soft gold when you make a wedge and insert it down among the cylinders, the tendency is to bring the gold right where you want it, and where there is room for it.

Dr. Swasey wished to correct a misapprehension. He understood the paper to say that in filling teeth with the aid of matrices one did not always see many portions of the cavity. Dr. Morgan claimed that he could fill teeth just as well when he did not see all portions of the cavity. His own remarks were to the purport that he should never use a matrix that would not permit him to see all portions of the cavity, nor one which could not be adjusted so that portions of the wall down to a little below the cervical margins should be free from it. When he said he must see every part of the cavity he did not mean by direct vision necessarily, but either directly or by the aid of a mirror. Of course he filled teeth (posterior cavities) without seeing them with the eye direct.

Dr. S. C. G. Watkins, Mont Clair, N. J., would like to hear the subject of implantation thoroughly discussed. What had been said upon it had been very instructive to him. He had had some experience in this operation, but not, of course, so much as some of the other gentlemen who have spoken. In one case, a tooth which was implanted about five years ago, the outer cusp split off about a year since. He then removed the inner cusp and ground the tooth, and put on a crown, which is still in good condition. He would like to know whether the gentlemen who have spoken favorably of the operation were particular about retaining the pericementum upon the root of the implanted tooth, or whether they removed it entirely.

Dr. Brophy wished to say a word upon the introduction of matrices. In looking up the history of matrices some years ago, he found in a copy of the *American Journal of Dental Science*, some thirty-five years old, an article from the pen of Dr. Dwinelle upon the use of matrices, and he believed that this was the first mention of the use of this device. For himself, he believes the matrix to be an excellent device when it is understood and properly used, but unless so understood and used it had better be let alone.

Adjourned till Thursday morning at 9 o'clock.

(To be continued.)

SOUTHERN DENTAL ASSOCIATION.

(Concluded from page 938.)

THIRD DAY—*Afternoon Session* (Continued).

DR. S. P. SHARP, of Knoxville, Tenn., read a paper entitled "A Plea for Nitrous Oxide in Cardiac Weakness." An abstract follows:

That the patient who is suffering from any form of disease of the heart needs protection from the shock incident to any sudden pain or excitement, will hardly be gainsaid. An agent which will furnish protection from such shocks, and at the same time be free from distressing effects, is to be commended. Such an agent nitrous oxide has proved itself to be in nearly thirty years of use. The writer quoted figures from Dr. Thomas's address before the joint meeting of the New Jersey and Pennsylvania State Dental Societies in 1891, and from the "American System of Dentistry," to show that in probably 10,500,000 administrations of gas in America only two deaths have been reported which could not be attributed to some other cause. As the gas was administered by practitioners of every grade of experience, from the most ignorant to the most learned, we certainly have in nitrous oxide an agent which should be hailed with delight by suffering humanity. Certainly no one will doubt that out of the vast number who annually take nitrous oxide there are not a few who are more or less affected with disease of the heart, yet death is almost unknown. At a low estimate the writer has administered it to more than a hundred coming from physicians who had pronounced their hearts too much affected for any anesthetic, yet he had never seen the first distressing case from its use in a practice that consumed more than forty thousand gallons of nitrous oxide each year. Have confidence yourself, then get your patient's confidence, so that there shall be no disturbance, and the road is clear, if you know how to give the gas. Granting that a possible death might occur from the use of nitrous oxide, the danger is so remote that there would likely be almost as many deaths from shock, in proportion to the number of operations, if nothing at all were used. He was fully convinced that the danger, if it existed at all, was not commensurate with the benefits derived.

Dr. John C. Storey, of Dallas, Texas, by permission read a paper on the "Home of the Southern Dental Association," which was a strong appeal for the establishment of a permanent place of meeting in one of the great cities. He would make it an institution of learning,—not merely a place where the members of the association should meet once a year, but a school where students can enter and be educated in dentistry from the very beginning ; a school whose certificate would not require the surveillance of a state examining board to determine if its holder was capable of practicing dentistry ; a school where knowledge was the only requisite for such certificate. To plant such an institution it would be necessary to endow it with a sum sufficiently liberal for the annual interest, supplemented with the fees from students, to command the best talent and amply pay a competent faculty. The paper outlined with some detail the plan which he advocated, which he claimed would "put the Southern Dental Association in the very forefront of progressive improvement, and circumvent every wish of a migratory nature, since it would leave nothing more to be said from an educational point of view."

Dr. Barton. The therapeutic value of nitrate of silver in the treatment of children's teeth is a subject of deep interest. He has used it considerably for that purpose, and he wishes to testify that all that has been claimed for it has been thoroughly sustained in his hands, as he finds it an excellent therapeutic agent when used as directed.

Dr. H. E. Beach, Clarksville, Tenn., would like to emphasize all that has been said in favor of nitrate of silver, especially as to its value in children's teeth ; but it can also be used to advantage in many cases for the teeth of older persons. He had in mind the case of a young lady who had a large superficial carious cavity in a lower molar. The bottom of the cavity was covered with crystals of nitrate of silver, which were sealed in with wax and left for about six weeks ; then the cavity was filled with gutta-percha. That was two years ago, and the decay was completely arrested.

Dr. J. N. Jones, Jacksonville, Fla., had discovered the fact that nitrate of silver would arrest the progress of decay in a peculiar way. He was operating for an old gentleman, whose teeth were so sensitive that he was compelled to desist from the work for a time. Finding that he could not fill the cavities at once, he painted them with lunar caustic. The application of the caustic made the teeth so comfortable that the patient concluded to wait a while before having the cavities filled. That was three or four years ago. About a year since he saw the patient, and the teeth at that time had not decayed.

Dr. L. G. Noel, Nashville, Tenn., reminded the members that the idea of the use of nitrate of silver in arresting decay is a revival of what was taught years ago by Tomes, who mentioned its value especially in the white rings which were sometimes found around teeth. It discolors the dentine, but that is not objectionable in posterior or lower teeth.

Dr. E. S. Chisholm, Tuscaloosa, Ala., stated that Dr. B. F. Arrington used nitrate of silver for the same purposes for which it is advocated here to-day, thirty-two years ago.

Dr. W. H. Richards, Knoxville, Tenn., called attention to the fact that while the use of nitrate of silver in dentistry is old, it was formerly used merely to allay sensitiveness; not to arrest decay, as is now advocated.

Dr. Jones said that the teeth of which he had spoken were not decayed, but were merely extremely sensitive, and it was this sensitiveness which the nitrate of silver allayed.

Dr. B. H. Catching, Atlanta, Ga., presented the subject of persistent effect of medicaments confined over the living pulp. He did not refer to the capping of exposed pulps, but to those cases where the dentine over the pulp is affected, and a piece of paper saturated with creasote is placed in the cavity over the partially disorganized dentine, and then permanently sealed there with a filling. The damage done by such practice he believed to be incalculable. He was convinced that it did just what it tried to prevent : that is, it caused the death of the pulp. The effect of a medicament so sealed in will surely be to incite inflammation of the pulp, and finally produce its death. When there is disintegrated dentine over the pulp, we must disinfect in some other way before we fill. He would not confine even the essential oils over the living pulp partially protected by diseased dentine. The common practice in such cases almost makes him think that dentistry is going on in the same way as medicine—by empirical methods ; only dental medicine seems even more empirical than general medicine.

Dr. R. C. Young, Anniston, Ala., believes that nitrate of silver does arrest decay, and his explanation is that the nitric acid is liberated through the affinity for the water in the saliva, and attacks the animal matter in the dentine, and the silver fills up the dentinal tubules to some extent.

Dr. John T. Crewes, Humboldt, Tenn., was in the habit of advising the use of lime-water after taking food as a preventive of decay, and he believed that his patients experienced the benefit of the advice when they followed it.

The subject was passed.

A paper by Dr. Louis Ottofy, of Chicago, on "Post-Graduate Study," was read by Dr. Stubblefield. An abstract follows :

Dr. Ottofy's paper was an argument for the continuation of study after graduation, and a statement of the aims and methods of the Post-Graduate Dental Association, the object of which is the dentist's cultivation and improvement while engaged in active practice. The plan of work is modeled on the Chautauqua system of reading, similar courses for the home education of the dentist having been established. The association has made arrangements with publishers to secure books at less than the market price, which it sells with the membership. The works selected for Class A are Black's "Anatomy of the Human Teeth," and Evans's "Crown- and Bridge-Work." Members are furnished a syllabus of the books, and with plain, simple directions to be carried out each month. In the study of anatomy, sections of teeth are to be made, the outlines of the pulp-chambers and the position of the root-canals studied, etc. In the study of crown- and bridge-work, the various operations must be performed, bridges made of German silver to be submitted for examination and judgment. Information and advice on obscure points will be cheerfully given by those in charge, and every reasonable effort made to assist the members to master the subjects.

The course will extend over two years. The examination will be written, the word of honor of the member as to his specimens and replies being accepted, and a certificate testifying to the fact will be issued to those who pass successfully.

Courses B, C, and D, for graduates, old practitioners, etc., will include studies in irregularities, physics, chemistry, bacteriology, dental jurisprudence, and the higher dental literature, including original research. In some of the classes, the examinations will probably exceed anything hitherto known. The projectors believe that their movement, looking to make dentists read, study, experiment, and improve themselves generally, will be felt in generations to come.

The Committee on Operative Dentistry was called, and Dr. L. G. Noel made a verbal report, explaining that owing to the unavoidable absence of the chairman, the committee had no set report to make. Several papers had been contributed and would be read in order.

Dr. Noel then read a paper by Dr. J. H. Allen, entitled "Some of the Causes of Failure in Gold Filling," of which we present an abstract:

We all know that unless the mechanical part of inserting a filling —*i.e.*, the shaping of the cavity and the insertion of the material— is practically correct, the work will be a failure; and the little things, if one will think of them, are so numerous that we can but wonder that we are so often successful. Not only the cavity, but the tooth itself, should be prepared, if necessary, for filling, an idea which the writer illustrated by relating an incident which occurred at a meeting where one of the clinicians was demonstrating the use of a mechanical mallet. The tooth was a superior second bicuspid, with a compound approximal cavity on the anterior and coronal surfaces, and extending well toward the gingival margin, a condition which had existed long enough for the first bicuspid to press backward until it extended partly into the cavity in the second. After the cavity was prepared, he was asked how long it would take him to fill it, and replied, "About three weeks." This he explained to mean that before putting in the filling, which could probably be done in an hour or an hour and a quarter, he would replace the first bicuspid in its proper position in the arch, and see that the parts were in proper condition; otherwise the crowding of the parts would cause the death not only of the intervening gum-tissue, but the destruction of the interdental alveolus by absorption, entailing a condition resembling pyorrhea alveolaris, besides which the filling would probably fail at the cervical portion. This illustration would indicate his general practice in cases of the kind. The point he wished to emphasize was that not only the cavity, but the tooth also, must be prepared before any permanent filling is inserted. Of course many cases can be prepared and filled immediately by using some of the many means of separating; but by all means get separation enough to finish and polish the work and leave it in the proper shape,—that is, with the surface not so flat as to allow the teeth to come together at the necks.

For work on the posterior teeth the writer recommended a set of six instruments with a bayonet bend, points of any shape to suit the taste. For other filling-operations he used a pair of Watling's right and left, foot-shapes, a set of Varney's, and Dr. Webb's pattern, Nos. 1 and 2, which last are hand instruments with very fine points bent right and left, which he found invaluable.

Another cause of failure at the cervical margin of approximal cavities is that the cavities extend so deep that near the cementum only a delicate line of enamel is left, which is easily broken away, causing trouble. He would extend the cavity deeper, removing the line of enamel. Excessive malleting was another cause of failure. Gold can be reduced to its maximum density by one blow as readily as by a hundred, if used in its proper shape. Continued hammering, when there is much rapidity, will powder up the tooth under the gold, so slightly perhaps it may not be discernible at the time; but a few months later there is recurrent decay under the filling.

But the most frequent cause of failure is that the filling is not properly finished. Unless this is attended to, failure will inevitably result.

Dr. E. S. Chisholm, Tuscaloosa, Ala., read a paper entitled "The Philosophical Idea in Operative Dentistry," in which he offered an explanation of some of the common causes of difficulties in anchoring fillings in teeth which are elongated and somewhat loosened in their sockets or have no teeth touching them, illustrating his ideas by diagrams upon the blackboard. He likened the filling of a tooth under these circumstances to the well-known philosophical toy, in which the first of a series of ivory balls suspended from a height so as to just touch one another is raised and allowed to fall against its neighbor, when the last ball in the series will fly off, the others remaining unmoved. The mallet represents the first ball, the filling-instrument, when held in contact with the filling-material, No. 2, the filling-material No. 3, both of these being of the unmoved series, while the tooth stands for the terminal, upon which the full force of the blow is expended, tending to force it away from the filling. If the instrument be not in absolute contact with the filling at the instant of the stroke, the series may be changed, as the instrument then becomes No. 1; but the tooth still continues to be the terminal, with perhaps worse effects than before, as the series is shorter. The rebound of the instrument also may cause a sort of double stroke, augmenting the evil still more. The effect of a side stroke against a filling under these circumstances would be equivalent to striking obliquely upon the handle of the instrument, causing a disagreeable jar, and condensing the gold unevenly against the bottom of the cavity, giving it a tendency to ride out.

The remedy is, to use hand-pressure in this class of operations; or place a hard wood or metal block between the tooth being operated upon and the one next beyond it, so as to get the greatest solidity. Brown's universal clamp is not without merit in these cases, and the writer has had valuable assistance from placing on the side of the tooth opposite the filling a piece of lead or heavy metallic instrument handle, which thus becomes the terminal, and the tooth one of the immovable series. He trusted he would not be misunderstood as condemning the use of the mallet, which he regarded as the only proper mode of condensing fillings.

Again, we have very different results in the use of straight and curved instruments. There can be but one effect from a straight instrument properly used, but a crooked instrument is very unsatisfactory unless carefully managed or so strong as to have no tendency to spring under the mallet. This idea was illustrated by the essayist by a diagram showing the application to crooked instruments, especially those of small diameter, of the well-known principle that the angle of reflection equals the angle of incidence.

Dr. Francis Peabody, Louisville, Ky., read a paper entitled "The Application of Vapor under Pressure for Diseased Tissue."

In the dental profession the use of disinfectants and antiseptics is often indiscriminate, and in some instances drugs which are not recognized as disinfectants seem to produce equally good results. The object of this paper is to bring before the profession a method of treating pulpless and diseased teeth not hitherto generally practiced, and which, in the writer's opinion, is destined to revolutionize to a certain extent methods now in use in oral and dental surgery. The writer had spoken upon this subject before the Mississippi State Dental Association; but, because of its importance, it seemed well to bring it before a larger body. The author of the process states that three years prior to the time his appliance was devised, it was his practice to fill the roots of abscessed teeth with crystals of iodoform, then with a heated instrument fuse the contents of the canals, forming a vapor which produced the desired result. Teeth treated in this crude manner have up to this time remained perfectly comfortable, and have shown no return of the disease.

The appliance which he finally devised consists of a small metallic cylinder through which passes a metal tube ending at one extremity in an ordinary syringe-point, and at the other connected with an ordinary syringe-bulb by a rubber tube. The metal tube is closed in the center, with a perforation at each end of the closure. The cylinder is partly filled with crystals of non-agglutinized iodoform, and heated over an alcohol flame or a gas-jet until the crystals are fused. The syringe-point is then placed in the root and the bulb compressed, forcing the vapor of iodoform into the canal, every part of which it permeates. So penetrating and searching is this vapor, that the tubuli are filled throughout and a precipitate deposited, forming a solid, insoluble filling in a manner more thorough than could be accomplished by any plastic material such as is used for root-filling. A large portion, if not the entire canal, can be filled in this manner; in any event, the apex can be hermetically sealed. The coarse, non-agglutinized iodoform is used in preference to the finer crystals, as giving a heavier precipitate and better general results.

The vapor thus forced into the canal desiccates the whole tract, and though iodoform in the dry state is not generally recognized as a disinfectant, when vaporized a portion of the iodine is set free and septic matter destroyed. It penetrates the apical foramen, and is brought into immediate contact with the peridental membrane, subduing whatever irritation or inflammation may be there, and gradually restores the tooth, if loose, to a firm position in its alveolus. Its advantages in so-called blind abscess are that the vapor will mix with the air, which forms a cushion to repel fluids, and so be brought into contact with every portion of the diseased tissue.

To show that the effect was due to the vapor itself, and not to the heat from it, Dr. Peabody instanced a case in his own practice, of a lady in whose mouth a left inferior bicuspid, from which a large phosphate filling was removed in an effort to discover the cause of pain and swelling in that region, was so sensitive that it would not tolerate the presence of anything in the canal. The tooth was loose; there was some enlargement of the gum, and a small fistulous opening near the gum margin. Loose cotton even was unbearable, and the round of the materia medica was gone through without result. Hot air was forced in at different sittings, but without avail. Iodoform vapor was then used. Three days later the patient reported that the tooth had been perfectly comfortable. The vapor was applied again, and the canal and crown filled at the same sitting. A week afterward the tooth was as tight as the others, perfectly free from irritation, and the fistulous opening had disappeared.

This method is equally applicable in disease of the antrum and for simple aphthæ; chronic pyorrhea is apparently cured by it, and exposed pulps have been successfully capped with the precipitate of iodoform from the vapor. In the infirmary of the Louisville College of Dentistry this treatment has been used, mostly by the students, on about six hundred teeth in various stages of disease, of which only two, so far as known, have been failures.

In using, the end of the syringe is placed as deeply in the canal as it can be made to go. After treatment by this method, even should any small particle of the contents of the canal remain after removal, they will be so thoroughly disinfected as to be innoxious, and will also be incased in solid iodoform from the precipitate.

This paper was not prepared for the purpose of extolling the virtues of iodoform, but to call attention to the value of vapor under pressure, which, as may be readily seen, will reach parts in diseased tissue that can be reached in no other way. Doubtless this method of forcing vapor under pressure from drugs will be found as valuable in general surgery as it has been in the oral cavity. Other drugs besides that discussed may produce as good or better results.

Dr. Noel read a paper by Dr. T. F. Chupein, of Philadelphia, in which he described a method of securing space for the adaptation of the rubber-dam by packing gutta-percha at both approximal surfaces, and, when the gum is forced away, removing the gutta-percha and wrapping gilling thread or ligature silk two or three times around the tooth, pushing it well up on the neck of the tooth, then tying and replacing the gutta-percha at the approximal surfaces. In a day or two the dam can be applied without the least difficulty. Dr. Chupein also called attention to a demonstration by Dr. W. H. Roop, of Philadelphia, of the feasibility of packing gutta-percha for fillings into a wet cavity, by covering its surface with a film of oil of cajuput; and to a small glass pipette devised by Dr. D. V. Beacock, of Brockville, Ontario, for annealing the surface of gold fillings requiring repair. He also stated that he had been successful in overcoming sensitive dentine in cases of exalted sensibility by applying a pencil of nitrate of silver to the decay. The agent blackens the surface, but the discoloration does not seem to extend any considerable depth, so that it is entirely removed in excavation, a procedure which is almost painless. He had also used the nitrate of silver successfully in neutralizing decay in large cavities in the sixth-year molars of children, applying the agent in powder, rubbing it into the disorganized tissue, and filling over this with gutta-percha.

Dr. Noel also read a paper by Dr. T. H. Parramore, of Hampton, Va., on "Sterilized Sponge in Pulp-Capping," and another by Dr. W. H. Cooke, Denton, Texas, entitled "Combination Fillings."

Dr. Cooke recommended filling cavities in molars and bicuspids with a combination of oxyphosphate and amalgam; mixing the oxyphosphate to nearly the consistence of putty, filling the cavity about two-thirds full, then while it is yet plastic introducing the amalgam in small pieces, and burnishing it in with the engine. The advantages claimed are perfect contact with the walls, the saving of enamel that would otherwise be cut away, and the retention of the natural color of the tooth. Teeth treated this way would undoubtedly last longer than if amalgam alone were used.

Dr. Parramore described his method of using sterilized sponge as a pulp-capping. Remove all foreign matter from the cavity, and cleanse perfectly with 1-500 solution of bichloride of mercury,—fingers, dam, cavity, instruments,—everything that directly or indirectly comes in contact with the cavity. Hold the sponge wrapped in oiled silk in the left hand, tear off a piece of the required size, place this upon the pulp at the point of exposure, if necessary dampening the cavity with the bichloride solution. Then fill with oxyphosphate, being careful not to dislodge the sponge. The tooth often aches for some time after the operation, but don't disturb it. In quite a number of cases so treated he has found the point of exposure covered and securely sealed with osteo-dentine, and the tooth alive and well. In one hundred and fifty cases of which he has been able to keep trace, he had a record of twenty-three failures.

Adjourned to 9 A.M. the next day.

FOURTH DAY—*Morning Session.*

The association was called to order pursuant to adjournment, President White in the chair.

A paper by Dr. J. L. Mewborn, Memphis, Tenn., entitled, "Is it True that the Machine Mallet pulverizes the Hidden Margins of Enamel?" was read by title, at the request of the author, owing to the lack of time, and ordered published in the transactions.

Dr. L. G. Noel, Nashville, Tenn., exhibited and explained the workings of a large variety of anesthetic apparatus.

Dr. R. R. Freeman, Nashville, is of the opinion that the dentist does not need to administer anesthetics. Many more teeth are lost every year because their extraction is made painless. Wherever anesthetics are largely in vogue, there is great devastation among the teeth of the masses. In his belief, fortified by experience, it is a rare case where it is necessary to administer an anesthetic. He would only permit it where the patient was so nervous that all shock must absolutely be avoided. The idea that when an anesthetic is to be administered a physician must be called in, is wrong. The dentist has his patients in charge from the time they get teeth, and he should be the man to say whether an anesthetic should or should not be administered. You should not depend on the ideas of the patient for the determination of this question, but on the judgment of the dentist. Many patients who come to his office expect to endure some pain. Others there are who want an anesthetic administered, but in all cases they must abide by his decision. The general introduction of anesthetics is to be deprecated. All this apparatus for the induction of anesthesia which has been shown and so clearly explained, looks to him like quackery. It reminded him of the old-fashioned dentist, forty or fifty years ago, spreading out his tools for the admiration of the patients and lookers-on. If an anesthetic must be administered, it is proper to consider which of the various drugs offered for the purpose is best to use. Nitrous oxide is not altogether satisfactory, in his opinion. Chloroform does kill occasionally, but in ether we have a material which will answer all our needs when anesthesia must be induced. All this apparatus is unnecessary in proper hands. He did not know to-day of anything which was superior for the administration of ether to a simple paper cone with a napkin in it. The usual mode of administration, as exemplified in this apparatus, seems to him to give the result without wasting the drug, without regard to other necessary features. The safety of the patient ought to be the first consideration. He supposed that none of them would think of asphyxiating their patients, yet with some of the apparatus which has been shown the administration of the anesthetic is almost equivalent to putting the head of a patient in a bucket of water, and holding it there till he is drowned. If we could be sure every time that the patient would come back to life, it would be all well ; but we do not know that we can bring him around. It may be said that nitrous oxide is less irritating than ether. The irritation of ether is because of the peculiar sensation produced by its coming in contact with nerves not intended to inhale ether. Let the patient cough a little, and the irritation will soon pass off, and he will breathe easily. Two ounces of ether is sufficient for the extraction of a tooth in any case, if the dentist has the proper control of the patient. One ounce is frequently enough. He has sometimes used two drachms successfully, but it was accomplished by having the patient under perfect control. It is an excellent plan before administering ether to have the patient breathe rapidly, as recommended by Dr. Bonwill, so as to get the lungs in full operation. For himself, he does not extract teeth without pain. He wants the patient to feel the benign influence of pain. When an anesthetic is a necessity, ether is all that is needed ; but do not let us use it for every case to save pain. So far as the effect of nitrous oxide in the extraction of teeth for patients who have heart-disease is concerned, he believes it is helpful because it avoids shock, but you can avoid shock by getting the confidence of the patient. If the patient gets it thoroughly into his head that the doctor knows exactly what he is about, an anesthetic will be rarely required.

The association proceeded to ballot for the place of the next meeting. Chicago was selected. The time for the meeting was ordered to be left with the Executive Committee.

Dr. Chisholm offered a resolution for the appointment of a committee of three to arrange and revise the methods of holding the clinics, requiring all members to be comfortably seated in front of the clinicians and to preserve order during the clinics ; such clinicians to be selected as should be competent both to instruct and give an explanation of each operation in minute detail.

The motion was adopted, after discussion.

Dr. L. P. Dotterer, Charleston, S. C., moved that the first members of the Clinic Committee be appointed one for one year, one for two years, and one for three years ; and each year thereafter one member to be appointed for three years ; the member first appointed for one year to be the first chairman, and to be succeeded thereafter in regular rotation by the member whose term would next expire. The motion was adopted, and the committee appointed as follows: For one year, Dr. E. S. Chisholm; for two years, Dr. L. P. Dotterer; for three years, Dr. L. G. Noel.

On motion of Dr. Richards, the Executive Committee was authorized to employ a permanent stenographic reporter, whose business it should be to furnish a synopsis of each day's doings to the Executive Committee before sending it out for publication, in order that the association might have control of the matter given to the public. The Executive Committee was also ordered to procure a seal for the association.

On motion of Dr. Storey, two hundred dollars were appropriated out of the funds in the treasury to the use of the Executive Committee of the World's Columbian Dental Congress.

The subject of Operative Dentistry was passed, and the Committee on Dental Hygiene was called. There being no response, the Committee on Dental Histology was called, and a report, by the chairman, Dr. E. P. Beadles, of Danville, Va., was presented, which, with the diagrams accompanying it, was referred to the Publication Committee, and the subject was passed.

The Committee on Voluntary Essays reported two papers: "Reflections upon the Present Status and Future Prospects of the Dental Profession," by Dr. W. W. H. Thackston, of Farmville, Va.; and "Does Climate and Location Modify Dentistry?" by Dr. John T. Crewes, of Humboldt, Tenn., which were ordered read by title and referred to the Publication Committee.

The Committee on Dental Appliances reported a large number of new and improved appliances, forms of material, etc., as having been shown, most of the dental manufacturers having taken part in the exhibit.

The Committee on Clinics reported that operations had been performed or methods of procedure demonstrated by the following gentlemen: Drs. W. T. Arrington, Jr., of Memphis; W. H. Marshall, Oxford, Miss.; J. T. Calvert, Spartanburgh, S. C.; Frank Holland, Wm. Crenshaw, and W. G. Browne, Atlanta; R. R. Freeman, Nashville; George Evans, New York; J. A. Dunn, Chicago; I. Simpson, Rock Hill, S. C.; and Edward C. Kirk, Philadelphia.

A committee of three, consisting of Drs. H. E. Beach, E. S. Chisholm, and B. H. Catching, was appointed to revise the constitution.

Dr. Wright, from the Committee on Necrology, reported a minute recording the sense of the association regarding the death of Drs. John Allen, Charles A. Kingsbury, and William Deason.

Dr. Edward C. Kirk, Philadelphia, by invitation addressed the association briefly, commending the enthusiasm of the members for their work. With such enthusiasm and proper organization, all things are possible. If he might be permitted to make a suggestion, it would be that under the plan of organization in sections their work would be more systematic, more thorough. Under the present organization, the association is dependent largely on voluntary efforts, into which the personal element always enters. In working under sections, papers are passed upon solely according to their merits, the personal equation being entirely eliminated. Dr.

Kirk then referred to the plan of organizing the entire working force of the profession, suggested in the DENTAL COSMOS and now under discussion for the American Dental Association, and which, when matured, promises to work well for all large bodies. The plan, in brief, comprised the formulation of a number of pertinent questions upon weighty topics, as the subjects for discussion in the state and local societies during the year: reports of the discussions to be forwarded to the governing body, there to be collated and digested for presentation to the body. As embodying the views of the profession all over the country, this would provide a basis for the formulation of a system of practice wholly American. It should be remembered that the making of the literature of the profession is in the hands of its practitioners, the journals being merely the vehicles for its dissemination; and in this view it behooves all of us to do what we may to elevate its character, by bringing forward the best that is to be had and suppressing that which is mediocre or commonplace.

On motion of Dr. Richards, the usual vote of thanks to those who had contributed to the success of the meeting was passed.

Dr. Beach moved the thanks of the association to Mrs. Dr. Cooke, Mrs. Dr. Lee, and Mrs. Dr. Brabson for their kindness in so beautifully decorating the president's desk, and to all the ladies who have aided so efficiently in making the occasion a social success. Adopted by rising vote.

The officers elect were then installed in their positions, Vice-President Luckie assuming the chair in the absence of the president.

Adjourned to meet in Chicago at the call of the Executive Committee.

SAN FRANCISCO DENTAL ASSOCIATION.

AT the regular monthly meeting of the San Francisco Dental Association, held in Mystic Hall, Union Square Building, San Francisco, Cal., October 10, 1892, the following officers were elected for the ensuing year: L. A. Teague, president; C. E. Post, vice-president; H. P. Carlton, recording secretary; W. F. Sharp, corresponding secretary; W. A. Knowles, treasurer; C. E. Post, librarian. WM. F. SHARP, *Cor. Secretary*, 500 Sutter street.

* * *

DENTAL SOCIETY ANNOUNCEMENTS.

MASSACHUSETTS BOARD OF REGISTRATION IN DENTISTRY.

A MEETING of the Massachusetts Board of Registration in Dentistry, for examination, will be held at the United States Hotel, Boston, Mass., on Tuesday, Dec. 13, 1892, at 9 A.M.

E. V. MCLEOD, *Secretary*,
New Bedford, Mass.

COMMITTEE OF THE WORLD'S CONGRESS AUXILIARY ON A DENTAL CONGRESS.

Dr. John S. Marshall,
Chairman.
Dr. G. V. Black.
Dr. N. Nelson.
Dr. C. N. Johnson.
Dr. A. E. Baldwin.

Dr. A. W. Harlan,
Vice-Chairman.
Dr. Geo. H. Cushing.
Dr. A. W. Freeman.
Dr. E. S. Talbot.
Dr. Geo. A. Christman.

PARTIAL LIST OF THE ADVISORY COUNCIL OF THE WORLD'S CONGRESS AUXILIARY ON A DENTAL CONGRESS.

Dr. W. D. Miller, Berlin, Germany.
Dr. F. Busch, Berlin, Germany.
Dr. Thos. W. Evans, Paris, France.
Dr. E. Magitot, Paris, France.
Dr. G. W. Sparrock, Lima, Peru.
Dr. W. B. Macleod, Edinburgh.
Dr. A. W. W. Baker, Dublin.
Dr. Earnest Sjoberg, Stockholm, Sweden.
Dr. Charles S. Tomes, London, England.
Dr. W. H. Coffin, London, England
Dr. W. Geo Beers, Montreal, Canada.
Dr. H. C. Edwards, Madrid, Spain.
Dr. E. Lecaudy, Paris, France.
Dr. — Plattschick, Pavia, Italy.
Dr. Joseph Arkövy, Buda Pesth, Hungary.
Dr. C. Redard Geneva, Switzerland.
Dr. J. C. Van Marter, Rome, Italy.
Dr. W. H. Morgan, Nashville, Tenn.
Dr. W. H. Dwinelle, New York City.
Dr. R. B. Winder, Baltimore, Md.
Dr. Elisha G. Tucker, Boston, Mass.
Dr. W. W. H. Thackston, Farmville, Va.
Dr. J. B. Rich, Washington, D. C.
Dr. W. H. Eames, St. Louis, Mo.
Dr. J. B. Patrick, Charleston, S. C.
Dr C. C. Knowles, San Francisco, Cal.
Dr. F. J. S. Gorgas, Baltimore, Md.
Dr. G. V. Black, Jacksonville, Ill.
Dr. J. E. Garretson, Philadelphia, Pa.
Dr. R. Finley Hunt, Washington, D.C.
Dr. E. Bacon, Portland, Me.
Dr. Benjamin Lord, New York City.
Dr. A. L. Northrop, New York City.
Dr. W. W. Allport, Chicago, Ill.
Dr. W. W Walker, New York City.
Dr. L. D. Carpenter, Atlanta, Ga.
Dr. J. Y. Crawford, Nashville, Tenn.
Dr. W J. Barton, Paris, Texas.
Dr. J. Taft, Cincinnati, Ohio.
Dr. C. S. Stockton, Newark, N. J.
Dr. L. D. Shepard, Boston, Mass.
Dr. H J. McKellops, St. Louis, Mo.
Dr. A. O Hunt, Iowa City, Iowa.
Dr. H B. Noble, Washington, D. C.
Dr. Geo. W. McElhaney, Columbus, Ga.
Dr. J. C. Storey, Dallas, Texas.
Dr. M. W. Foster, Baltimore, Md.
Dr. A. W. Harlan, Chicago, Ill.
Dr. J. S. Marshall, Chicago, Ill.

THE WOMAN'S COMMITTEE OF THE WORLD'S CONGRESS AUXILIARY ON A DENTAL CONGRESS.

Dr. Hattie E. Lawrence,
Chairman.
Dr. Emma Benham.

Dr. Marie T. Bacon,
Vice-Chairman.
Dr. Louise Peterson.

Dr. Rebecca McIntosh.

PARTIAL LIST OF THE WOMAN'S ADVISORY COUNCIL ON A DENTAL CONGRESS.

Dr. Lucy Hobbs Taylor, Lawrence, Kansas.
Dr. Olga Neymann, New York City.
Dr. Jessie Ritchie, Des Moines, Iowa.
Dr. Jennie Hilton, Fort Atkinson, Wis.
Dr. Clara W. McNaughton, Washington. D. C.
Dr. Kate C. Moods, Mendota, Ill.
Dr. Martha J. Robinson, Cleveland, Ohio.
Dr. Annie F. Reynolds, Boston, Mass.
Dr. Mary T. Benfield, Honolulu, Hawaii.
Dr. Marie Holst, Aarhuus, Denmark.
Dr Henriette Tiburtius-Hirschfield, Berlin, Germany.
Dr. Helene Wongl v Swiderska, St. Petersburg, Russia.
Dr. Bella Meller, Vienna, Austria.
Dr. Helene Freudenheim, Königsberg, Germany.
Dr. Marie M. Schneegans, Elberfeld, Germany.
Dr Emma Lacey, London, England.
Dr. Clotilde Lenta, Rome, Italy.

EDITORIAL.

CHANGES IN CHEMICAL NOMENCLATURE.

THE need of a reform in the spelling and pronunciation of chemical terms has for some time been very generally acknowledged. Much confusion has arisen from the existence of two distinct methods, both in general use by eminent authorities in chemistry, for the spelling and pronunciation of such words as bromid(ide), oxid(ide), chlorid(ide), amin(ine), gelatin(ine), morphin(ine), etc. The use of distinctive suffixes in chemical words is of undeniable value when consistently used to designate similar class compounds. Any violation of this rule necessarily leads to much confusion and renders the significance of the class suffix valueless. With a view to overcoming the inconsistencies of former methods and the resulting confusion of meaning, the Chemical Section of the American Association for the Advancement of Science some four years ago appointed a Committee on Spelling and Pronunciation of Chemical Terms, to take action in the matter and suggest such changes and additions as they deemed proper and advantageous. Pursuant to this idea, the committee opened correspondence with leading American philologists and chemists, seeking to obtain a "thoroughly representative expression of opinion on the questions coming within the scope of its commission." Three preliminary reports were distributed to American chemists, inviting extended criticism and suggestion. The substance of the replies to these, carefully digested, was submitted to the Chemical Section for detailed discussion and decision. The final report of the committee embodies the results of these four years of correspondence and discussion, and was adopted at the meeting of the American Association for the Advancement of Science held in Rochester, N. Y., during August, 1892. Among the prominent changes in spelling and pronunciation are the following: The final *e* is dropped from all words terminating in *ide*, and the syllable pronounced *-ĭd* (as chlorid, iodid, hydrid, oxid, hydroxid, amid, anilid, murexid). The final *e* is also dropped from the names of all elements and compounds which formerly terminated in *ine* (except doubly unsaturated hydrocarbons), and the syllable pronounced *-ĭn* (as chlorin, bromin, etc., amin, anilin, morphin, quinin, vanillin, alloxantin, absinthin, emulsin, caffein, cocain). The spelling al′ūminum is authorized instead of aluminium, and *f* is used instead of *ph* in the spelling of sulphur and its derivatives (as sulfur, sulfid, sulfite, sulfate, sulfo-, etc.). This change in the spelling of sulphur, though it is radical, is simply a return to the original form of its spelling, is in consonance with its spelling in other modern languages, and is in harmony with phonetic requirements. The substitution of *ph* for *f* in this word was a distinctly modern innovation.

In view of the importance and value of the reform in spelling and pronunciation of chemical terms advocated by the American Association for the Advancement of Science, and the weight of authority which has been given to the report of the committee of its Chemical Section through its acceptance and publication by this body, the DENTAL COSMOS will adopt the new method as its standard for the spelling of chemical terms, commencing with the issue for January, 1893, and we respectfully urge upon our contributors the propriety of gaining a familiarity with the revised nomenclature by a study of the report, copies of which may be had by addressing the secretary of the committee, Dr. James Lewis Howe, Louisville, Kentucky, or by writing to the Commissioner of the Bureau of Education at Washington, D. C.

The system has been adopted by the editors of Funk & Wagnall's Standard Dictionary; also by the *Journal of Analytical and Applied Chemistry*, of Easton, Pa. It is used by Prof. Geo. C. Caldwell, of Cornell University, and President of the American Chemical Society, in the second edition of his "Elements of Chemical Analysis"; by Dr. T. Sterry Hunt in "Systematic Mineralogy"; and by Dr. R. A. Witthaus in his "Manual of Chemistry."

The work of spelling reform in scientific nomenclature is one which is slowly but steadily progressing. The need for greater simplicity and the elimination of all that is inconsistent, superfluous, or misleading, is generally recognized. While we have no sympathy with the extremists who are constantly obtruding upon the world so-called systems of simplified spelling, which are usually so grotesque, empirical, and radical as to be self-condemnatory, we heartily welcome such carefully considered systematic changes as are here noted. They are in harmony with the spirit of progressive science, and should be so accepted by all who are interested in the cause of scientific accuracy and simplicity. The need for a similar and thorough revision of dental nomenclature is freely acknowledged, and the relegation of this work to a competent committee of the World's Columbian Dental Congress, who will be requested by the General Executive Committee to "present a plan by which a universal system of nomenclature may be adopted by the Congress that would be acceptable to the profession of the entire world," gives ground for the hope that the much-desired improvement in this field will be attained through its efforts.

In this connection we desire to call attention to the dropping of the final *e* in the word dentine, the spelling *dentin* being the form used in both the Century Dictionary and Foster's Medical Dictionary, and it has been adopted as the preferred form by the editors of Funk & Wagnall's "Standard Dictionary." The final *e* was dropped in the case of this word by the editors of these dictionaries to bring its spelling into harmony with that of the new spelling of similar words as noted in the report of the Chemical Section of the American Association for the Advancement of Science. We have not yet adopted "dentin" as our office standard, as we preferred to await the action of the Committee on Nomenclature of the World's Columbian Dental Congress, who will no doubt give it official consideration. The names of the teeth and their surfaces, and the terminology of their anatomical and histological elements from the standpoint of both human and comparative anatomy, need systematic revision and simplification. Much of the difficulty in the way of such a reform in dental nomenclature heretofore has grown out of the lack of organization and authority for the work. This difficulty is now happily surmounted by the appointment of the World's Congress Committee for this purpose, which should have the hearty furtherance and co-operation of the whole dental profession in its work. Any suggestions as to revision of or additions to dental nomenclature will be gladly received by the committee, and can be sent to the chairman, Dr. G. V. Black, Jacksonville, Ill., or through the DENTAL COSMOS.

THE PAN-AMERICAN MEDICAL CONGRESS.

AT the meeting of the American Medical Association held at Washington, D. C., May 5, 1891, a resolution was introduced and carried authorizing an invitation to be sent to the medical profession of the western hemisphere to assemble in the United States in an Inter-Continental American Medical Congress. In furtherance of this object, by the concurrent action of both houses of the United States Congress, approved July 18, 1892, the President was authorized and requested to invite the several governments of the western hemisphere to send official delegates to the meeting of the Pan-American Medical Congress, to be held in the city of Washington, September 5, 6, 7, and 8, 1893.

The preliminary announcement of the work of the committees as thus far completed has just been issued. The permanent officers are William Pepper, M.D., LL.D., Philadelphia, president; Charles A. L. Reed, M.D., 311 Elm st., Cincinnati, O., secretary-general; Abraham M. Owen, M.D., Evansville, Ind., treasurer; Dr. Samuel S. Adams, 1632 K st., Washington, D. C., chairman of the committee of arrangements.

The other officers, of whom there is a large list, including about seventy vice-presidents, are disposed of as incorporators, trustees, executive committee, committee on ways and means, and auxiliary committee. Twenty-two sections are provided, each with its full quota of officers, for the systematic division of the work. Of these, No. 19 is the Section on Oral and Dental Surgery, of which M. H.

Fletcher, M.D., D.D.S., of Cincinnati, is executive president, Dr. John S. Marshall, of Chicago, is the English-speaking secretary, and Dr. Ramón Campuzano, of Philadelphia, is the Spanish-speaking secretary. There are, besides, eleven other secretaries and eighteen honorary presidents. The equipment of this section is one which guarantees the dignified and faithful presentment of this important specialty, and the maintenance of the claim which it makes for parity in relation with its sister specialties in the healing art. It is perhaps to some extent unfortunate that its meeting occurs so closely upon that of the World's Columbian Dental Congress, as the allegiance of the dental profession to this meeting, which is devoted solely to its interests, cannot now be doubted ; but as the Pan-American follows it so closely, it should have a large attendance of those from foreign countries who will remain over or who will visit Washington on their return trip from Chicago.

BIBLIOGRAPHICAL.

ANATOMY. By FRED J. BROCKWAY, M.D., Assistant Demonstrator of Anatomy, College of Physicians and Surgeons, New York, and A. O'MALLEY, M.D., Instructor in Surgery, New York Polyclinic. Volume I, Student's Quiz Series. Pp. 360 and Index.

HISTOLOGY, PATHOLOGY, AND BACTERIOLOGY. By BENNETT S. BEACH, M.D., Lecturer on Histology, Pathology, and Bacteriology, New York Polyclinic. Volume IV, Student's Quiz Series. Pp. 159 and Index.

MATERIA MEDICA AND THERAPEUTICS. By L. F. WARNER, M.D., Attending Physician, St. Bartholomew's Dispensary, New York. Volume V, Student's Quiz Series. Pp. 224 and Index.

These three volumes of the Student's Quiz Series are excellent examples of the thoroughness and faithfulness which characterize the work done in this group of publications. The statement by the publishers that "it is a series covering the essentials of a thorough medical education" is, so far as these three books give evidence, fully substantiated. The matter is arranged in the form of questions and answers, and leaves nothing to be desired in range or completeness. As an aid to the student, for whom they are especially designed, these manuals are invaluable, as they embrace the essential features of medical science within the limits of their respective titles, and the manner of presentation is concise and clear, hence readily attainable by the least expenditure of time and trouble. They are not intended to replace the larger text-books, and should not be so used, but rather as an aid and adjunct to more extended and elaborate study. The series, to comprise thirteen volumes, is published by Lea Brothers & Co., Philadelphia, and is "sold at the uniform price of $1.00 per volume, except in case of the volumes on anatomy and surgery, which, being nearly double in size, have been priced at $1.75."

NAPHEYS' MODERN THERAPEUTICS, MEDICAL AND SURGICAL, INCLUDING DISEASES OF WOMEN AND CHILDREN. A Compendium of Recent Formulæ and Therapeutical Directions from the Practice of Eminent Contemporary Physicians, American and Foreign. Ninth edition, revised and enlarged. Volume I, General Medicine and Diseases of Children. Edited by ALLEN J. SMITH, M.D., Assistant Demonstrator of Morbid Anatomy and Pathological Histology, Lecturer on Urinology, University of Pennsylvania, etc.; and J. AUBREY DAVIS, M.D., Assistant Demonstrator of Obstetrics, University of Pennsylvania; Assistant Physician to Home for Crippled Children, Philadelphia. Royal octavo. Half Russia, marbled edges. Pp. 1000. Philadelphia: P. Blakiston & Sons, 1012 Walnut street. Price, $6.00, net.

The ninth edition of this standard work shows a decided improvement over former editions in the very complete manner in which the work of revision has been carried out. The text has been rearranged and much of it rewritten, making the matter more available for ready reference, and bringing it into harmony with accepted methods of practice. The views and therapeutic procedures of eminent specialists in each department are fully given and discussed, and the modes of employment and relative value of new remedies, including the latest editions to therapeutical agents, are comprehensively treated. The book should be included in the equipment of all practitioners of the healing art.

A POCKET MEDICAL DICTIONARY. Giving the Pronunciation and Definition of about 12,000 of the Principal Words used in Medicine and the Collateral Sciences. By GEORGE M. GOULD, A.M., M.D., author of "A New Medical Dictionary"; Ophthalmic Surgeon to the Philadelphia Hospital. Including very complete tables of the arteries, muscles, nerves, bacteria, bacilli, micrococci, spirilli, and thermometric scales, and a dose-list of drugs and their preparations, in both the English and metric systems of weights and measures. Philadelphia: P. Blakiston, Son & Co., 1012 Walnut street. 1892. Price, flexible leather binding, $1.00.

By reason of the large number of words which it contains, the clearness and exactness of its definitions, its convenient form and small compass, which latter has been in no way secured by a sacrifice of typographical clearness, we regard this as altogether the best elementary word-book designed for the pocket, and the ready reference of medical and dental practitioners, that we have yet seen. The words included in it are those which are in general use at the present time, embracing all the later additions to medical nomenclature. The tables of arteries, nerves, muscles, micro-organisms, and comparative thermometric scales are extremely useful additions.

ANESTHETICS: THEIR USE AND ADMINISTRATION. By DUDLEY WILMOT BUXTON, M.D., B.S., Member of the Royal College of Physicians; Administrator of Anesthetics and Lecturer in University College Hospital, the National Hospital for Paralysis and Epilepsy, Queen's Square, and the Dental Hospital of London. Second edition. Pp. 222. Philadelphia: P. Blakiston, Son & Co., No. 1012 Walnut street, 1892. Price, cloth, $1.50.

We know of no work on the subject which, taken all together, gives a more satisfactory presentment of the whole field of anesthesia and anesthetic agents than this one. It is written from the standpoint of a practical experience which is strengthened and enriched by a full and accurate knowledge of the scientific principles involved. If one feels inclined to criticise, it is only upon minor details, as, for instance, the manner advocated for the administration of nitrous oxide, which we understand to be the one mainly employed in Europe; it differs in some respects from that which has been found most desirable and satisfactory in this country. These are, however, not defects; and, for its value as a comprehensive statement of the best that is known upon this most important subject, and as a safe and lucid guide to all who desire reliable and practical information respecting it, we cordially recommend this volume.

THE RISE, FALL, AND REVIVAL OF DENTAL PROSTHESIS. Introductory Lecture by B. J. CIGRAND, B.S., D.D.S., Professor of Dental Prosthesis in the American College of Dental Surgery. Published by request of Class, 1892. Chicago: Severinghaus & Beilfuss, 448 Milwaukee ave. Pp. 100 and Index. Price, cloth, $1.50; leather back, $2.00.

In this small volume the author has presented a historical *résumé* of the progress of dental prosthesis from the earliest known efforts in this direction to its present perfected state. The references and data respecting antique dentistry are extremely interesting, and the author is to be congratulated on the result of his labors in this field of research, which must have been long and painstaking. Besides the interest which its perusal excites, its direct effect is to stimulate a higher appreciation of this important branch of dental practice, and for this reason, as well as for the information which it contains, we commend it to the consideration of all who would be *au fait* with the historical progress of dentistry.

OBITUARY.

DR. FREDERICK A. REINHARDT, SR.

DIED, at Pittsburg, Pa., November 2, 1892, of paralysis, Dr. FREDERICK A. REINHARDT, SR., in the sixty-seventh year of his age.

Dr. Reinhardt was born at Baden, Germany, in the year 1825. He was educated at the University of Heidelberg, and after completing the course entered the German army as surgeon. After six years, during which time he received several "Awards of Honor" for efficient services, he attained the rank of chief surgeon to the army staff. In 1872 he, with his family, came to America to visit relatives, and preferring the land of liberty to the military honors of his native country, he entered into the practice of dentistry at Pittsburg, where he remained up to the date of his death. He leaves a widow and seven children. Two sons studied dentistry,—Dr. F. A. Reinhardt, Jr., who died in 1883, and Dr. Adolph G. Reinhardt, who is practicing in Pittsburg.—R.

DR. JOHN E. REGISTER.

DIED, in Philadelphia, Pa., November 8, 1892, of tuberculosis of the bowels, JOHN E. REGISTER, D.D.S., of Dover, Del., in the forty-seventh year of his age.

Dr. Register was born in Dover, Del., September 25, 1846. His dental pupilage was passed with his brother, Dr. Henry C. Register. He was a graduate of the Pennsylvania College of Dental Surgery, class of 1869, and was awarded a certificate of honor for careful and artistic operating. He commenced the practice of dentistry at Port Deposit, Md., where he remained for several years, afterward removing to Milford, Del., and finally to Dover, where he had been in practice for the past twelve years. He was a member of the Delaware State Dental Society. He had made a special study of chemistry, taking a great interest in that subject, and applying his knowledge of it in dental practice to the improvement of plastic filling-materials.

Dr. Register married Miss Du Hammell, of Dover, who died about five years ago. He leaves as survivors two daughters. He was a member of the Episcopal Church.

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PERISCOPE.

TROPACOCAINE (BENZOYL-PSEUDO-TROPEIN), A NEW LOCAL ANESTHETIC.—A new alkaloid has recently been isolated by Giesel from the leaves of "a small-leaved coca-plant" of Java, and its chemical constitution and properties have been thoroughly studied by Liebermann, who proved that the substance was benzoyl-pseudo-tropeïn, and succeeded in separating the pseudo-tropeïn, and then from it made benzoyl-pseudo-tropeïn synthetically. It is considered by Liebermann to be chemically identical with the pseudo-tropeïn from *Hyoscyamus niger;* and it therefore belongs to the atropine series (tropeïn group of Landenburg).

From the presence of benzoyl-pseudo-tropeïn in a species of coca-plant, it might be expected to resemble cocaine in physiological action; but, on the other hand, its chemical constitution points to a physiological action not unlike that of atropine. Actual experiment has shown that benzoyl-pseudo-tropeïn is a powerful local anesthetic, resembling, but not identical in local action with, cocaine. In the eye it causes neither the ischæmia characteristic of the *true anesthetics* (cocaine), nor the marked irritation and hyperæmia of the group of substances called by Liebreich *Anæsthetica dolorosa*, but is physiologically a connecting-link between the two classes.

The synthetical hydrochlorate of the base, if dissolved in physiological salt solution, seldom causes even temporary smarting or hyperæmia; but the preparation made directly from the leaves is more irritating, probably because of slight impurities. The alkaloid is almost insoluble in water, and the synthetical hydrochlorate of benzoyl-pseudo-tropeïn, or tropacocaine, as it is called for convenience, has been used in all experiments.

The most important differences between the action of tropacocaine and cocaine on animals are probably the following:

1. Tropacocaine is less than one-half as toxic as cocaine.
2. The depressing action, both on the cardiac motor ganglia and the heart-muscle, especially the latter, is much greater with cocaine.
3. Local anesthesia, both of the eye and skin, is much more quickly complete with tropacocaine, and is possibly of longer duration.
4. Slight hyperæmia is occasionally present, but quickly disappears, while, with cocaine, only ischæmia is seen.
5. Mydriasis is usually absent, but always seems to be less than after cocaine.
6 Solutions of tropacocaine are moderately antiseptic, and retain their strength for at least two or three months. Cocaine solutions often begin to lose their activity when three or four days old.—*Brit. Med. Jour.*, Aug. 20, 1892.

PHENOSALYL.—At Pasteur's Institute, Paris, Dr. de Christmas has been devoting his attention to a mixture of antiseptics, which he calls phenosalyl, and which has the following composition: Carbolic acid, 90 parts; salicylic acid, 10 parts; lactic acid, 20 parts; menthol, 1 part. The three acids are heated up to the point of liquefaction, when the menthol is added. The mixture is reported to be very soluble in glycerin, and easily soluble in water to the extent of four per cent.

The author has made a careful comparative study of the action of phenosalyl on the staphylococcus aureus, the schizophyte most resistant to the influence of chemical bactericides, and has found it to be possessed of enormous antiseptic power; the latter is almost double that of its two constituents—carbolic and salicylic acids—taken separately, and is exceeded only by that of corrosive sublimate.—*Merck's Bulletin*, Sept. 15, 1892.

STOMATOMYCOSIS.—Altmann, of Vienna, records two cases of this disease. One, an old woman of sixty years, who had been attacked with croupous pneumonia, and three times since with the local inflammation in the lung. When he saw her, in July, she was weak and feeble and highly nervous, complaining of cough and difficulty in breathing, which he diagnosed as croupous pneumonia. On the ninth day it reached a crisis, after which the temperature fell, leaving a chronic bronchial catarrh, with infiltration of the apices. On the thirteenth day the temperature rapidly rose again, the patient complaining of difficulty in swallowing, and dryness of the mouth and throat. Examination revealed a white, thick covering extending over the whole surface of the mouth, tonsils, fauces, and posterior part of the nasal cavity. With a sublimate lotion the oïdum albicans rapidly disappeared. This lasted lasted eight days, but recovery soon followed.—*Med. Press*, August 31, 1892.

LEGAL RESTRICTIONS RESPECTING THE ADMINISTRATION OF ANESTHETICS IN FRANCE.—In a late issue of the *Revue Odontologique* it is stated that the proposed new law now pending in the French parliament for regulating the practice of medicine makes it illegal for dentists who are not provided with French diplomas in medicine or dental surgery to practice anesthesia without the assistance of a doctor or an officer of the public health.

Even the existing law has been construed by the tribunals, in a case recently tried, to prohibit the use of cocaine as an anesthetic agent by dentists who are not doctors of medicine. A dentist and his assistant were held for injury by negligence and for illegal practice in administering cocaine in a case which resulted in nervous disorder and palpitation of the heart, and they were punished by fines and costs of suit.

PUBLISHER'S NOTICE.

A WORD TO SUBSCRIBERS.

THE current issue of the DENTAL COSMOS completes our contract with subscribers for 1892, to "present in the best manner the best that dentistry affords" for that year. We are ready to renew the contract on the same terms for 1893.

We have no doubt that those who have been with us as subscribers through the year will testify that we have faithfully carried out our engagement, as freely as we accord to them our cordial thanks for their generous support.

Having kept our faith with them, we can see no good reason why every present subscriber should not wish to be served in the same manner for the coming year; no good reason why there should not be an unanimous renewal of subscriptions. And inasmuch as there is no time for doing a good act like the moment when it is in mind, may we ask them to renew at once?

The year has kept its promise of plentiful literary supplies of high quality. The pages of the DENTAL COSMOS bear testimony that the profession is not "written out"; but that, on the contrary, the literary faculty is rapidly developing among dentists; that it is becoming the "habit" of the well-equipped practitioner to write intelligently and instructively of the subjects which interest dentists. New names are constantly added to the roster of those who have something to say, and who know how to say it, about the new facts which original research and careful experiment are revealing from day to day.

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We therefore confidently invite those who have not been subscribers to join the ranks at once. For their benefit we repeat that no man who expects to keep in the forefront of dental progress can expect to do so unless he is a reader of the DENTAL COSMOS. No other journal gives a complete survey of the entire field of dentistry.

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THE S. S. WHITE DENTAL MFG. CO.

HINTS AND QUERIES.

TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—I desire to correct an erroneous impression arising from a sentence in the published report of the American Dental Association, contained in the September DENTAL COSMOS, 1892, and from similar words in the editorial of the same issue.

The words referred to are respectively, "the president indorsed *the suggestion of the* DENTAL COSMOS," etc. (p. 753), and "the American Dental Association adopting *a suggestion of its president*," etc. (p. 763). Permit me to state that the suggestion set in motion and acted upon by the American Dental Association was first made by me to the First District Dental Society of the State of New York, and will be found published in the January COSMOS, 1890, beginning with the last paragraph on the bottom of page 41, and continuing on the top of page 42. I trust that you will give this letter place in one of the near issues of the DENTAL COSMOS.

Sincerely yours, L. ASHLEY FAUGHT,

PHILADELPHIA, Oct. 25, 1892. 1331 Arch street.

TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—The following is the description of a case of replantation performed by me about two years ago; as it possesses one or two points rather new in replantation, it may interest some of your readers. A young lady, highly nervous (unfortunately like most of our patients in this country), about twenty years of age, sent for me, as she was suffering from a very severe toothache, as she called it. On my arrival, I found her suffering from a blind abscess on the right superior lateral. There was a great deal of swelling of the upper lip and face, and the tooth was so sensitive and inflamed as not to bear the slightest touch. She wanted instantaneous relief, saying that it was impossible to bear the pain any longer. Under these conditions it was quite out of the question for me to open up the canal, and as lancing would have done no good, I therefore advised her to let me take the tooth out, promising to replant it the next day, after she had thoroughly rested during the night. She consented to the operation, and I extracted the tooth under gas, afterward filling the socket up with cotton wool saturated with a twelve per cent. solution of phénol sodique, and telling her to come back the next day for the replantation.

In the mean time I had cut off the crown of the extracted lateral (which was too far decayed to be worth filling) and put on a Richmond crown, after having thoroughly cleansed out the root-canal with antiseptics, etc., and rounding off the apex to prevent irritation. The root being quite ready, I then put it into a solution of carbolic acid (two per cent.), and there let it remain until the return of my patient. About nine days after the operation she came back, saying that she was afraid to come before but had been very particular in keeping clean cotton in the wound. I at once examined the tooth-socket, and found it was well open, with a healthy appearance, but not a particle of the alveolus left, leaving two large flaps of gum which formed a soft and fleshy socket for the reception of the tooth. After washing the cavity with a little warm water, I immediately commenced to put the tooth in place, which I had to force into position, this causing at the time some pain. I tied it very carefully to the other teeth, and told my patient that I could not answer for a success, as I had never replanted a tooth after such a long interval and after such a complete absorption of alveolus. She came in to see me every two days for about a fortnight, during which time I gave her an antiseptic and astringent mouth-wash, as the parts surrounding the replanted tooth were very inflamed. In three weeks it was sufficiently firm to permit me to remove the strings; and I then lost sight of her for nearly two years, when she returned to show me the tooth, which was firmly set in a new alveolus and apparently as strong as any of her other teeth.

I have performed many cases of replantation, but never under such circumstances.—WILLIAM T. BORTON, D.M.D., St. Petersburg, Russia.

TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—One of my patients presents the following anomaly, which seems worthy of record. Miss C. has an abnormal left superior central incisor, on the lingual surface of which is a process of horn-like shape, curving from the base downward to the cutting-edge, as shown in Fig. 1, *a*. At the time of her first visit, I cautioned the patient not to allow food to remain on the palatal surface, as the "horn" invited caries. I did not see her again for several years, when, as I had anticipated, a large cavity had formed. This continued to enlarge until the pulp died, and the tooth crumbled away half-way up to the gum-margin, the horn alone withstanding the attack. The horn became so annoying that she came to have the tooth extracted. The root being strong, I advised crowning. I excised the remaining part of the crown and the horn, and mounted a Logan crown. The most interesting feature of the case is that the pulp extended into the process almost to the top, as shown in Fig. 2.—WILLIAM H. MITCHELL, D.D.S., Bayonne, N. J.

FIG. 1.

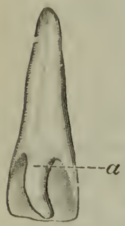
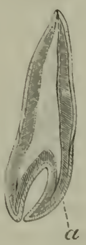


FIG. 2.



TO THE EDITOR OF THE DENTAL COSMOS:

Sir,—In reading the correspondence from Dr. Raymond in the June number of the DENTAL COSMOS, I think the doctor's views are all right concerning the automatic mallet. I have been working since 1885 with the automatic mallet, and, like Dr. Raymond, I also have had no patient who preferred the blow of other mallets, and I have worked in that time with the electric and the Bonwill-engine mallets, always returning to my first love, the automatic. Like Dr. Ottolengui and Dr. Raymond, I have had fillings inserted in my own teeth by the electric, the Bonwill-engine, the hand mallet, and the automatic, and I prefer the last. In Europe there are very few dentists who use any other system than the automatic mallet, and remark that they do so because with this mallet there is no trouble with batteries or necessity for a malleting assistant, etc.; in a word, because the automatic mallet constitutes the simplest form of an instrument for condensing gold.

Is there not a prominent dentist in the United States who would give us a good article about this form of mallet? I mean a paper in which the writer explains fully how to use and how to abuse the automatic mallet, and also why he prefers this system.

I am sure that such a paper would be welcomed, and find its way through the European journals, as I know there is a want for such an explanation of this instrument and its proper application. In looking through the American dental literature, one finds papers concerning the electric mallet (Dr. Marshall H. Webb's book on Operative Dentistry contains a complete analysis of this system), the hand mallet, and the engine mallet, but none concerning the automatic mallet. Why is it? It is generally admitted that just as good work can be done with the automatic mallet as with any other system; so I think that those dentists who use it should feel, as Dr. Raymond says, "like taking up the cudgel in defence of the most useful instrument in the hands of the profession."—EMILE C. W. SANDRÉ, Vienna, Austria.

SMUDGED GOLD.—The common method of annealing gold mats, pellets, or cylinders, by holding them over or in the flame of an alcohol lamp or Bunsen gas-burner, is a practice which, while ordinarily successful, is liable to occasion defects in the fillings.

The resulting imperfections are not often observable in flush-finished fillings, although some of these subsequently scale at marginal points on their surfaces; but elaborate building or contour work not infrequently meets with most disappointing disaster, due to the smudging of the gold by the incomplete combustion of the flame-fuel. Yet the real cause of the calamity is unnoticed, and fault found with the gold, or the possible presence of a leak in the dam or other source of moisture suspected, whereas the first thought following the surprising failure should be, "The flame is at fault." Clearly one of the most important preliminaries to a gold operation should be a careful scrutiny of the annealing flame, to be sure beyond a peradventure that there is not a trace of smoke; that the combustion is perfect. The wick of the alcohol lamp is usually too tight in its tube, and not loose enough in its assemblage of fibers to permit a free flow of the fluid fuel. Of course, the appearance of a single glow-point at a fiber-end of the wick is a certain sign of smoke, and should at once be remedied. When a lower grade than 95 per cent. alcohol is used, the residual fluid after a few hours' burning becomes so watery as to lessen combustion, and cause the charring of the wick-end. The sight of a blackened wick-end leaves no doubt as to the probable character of the annealing, and the operative work done by the use of that lamp.

The illuminating gas of diverse cities differs in quality, and even in the same city varies from time to time in its heat- and light-giving properties; therefore the ordinary Bunsen burner is liable to vary in its degree of combustion; but the habit of closely observing the flame and keeping it regulated to the blue point of complete combustion, will tend to the avoidance of the risk of smudging, the main thing being to be sure that the burner is a good one. It is well to keep at hand a piece of white porcelain,—for instance, a small butter-plate,—and by occasionally holding it for a minute or two over the flame, gain an assurance of the entire absence of smoke. When the gas is of a poor quality, the impurities and the gaseous products of their combustion contaminate the gold to a degree incompatible with a perfect welding or cohesion.

The mica method of annealing is preferable, as avoiding all risk of a smudge; but many practitioners are confirmed in the habit of flame annealing, and will probably continue to employ the means to which they have become accustomed, and which it is believed may be satisfactorily modified in the particulars herein mentioned.—W. STORER HOW.

The Black Teeth of the Japanese.—The custom which was formerly prevalent among the princes, noblemen, and all married women in Japan of staining the teeth a deep black is now practically discontinued, but is indulged in to some degree by the inhabitants of the interior districts. The method of producing the black stain, or, as it is termed in Japanese, "Ohaguro" (*O*, an honorable prefix; *ha*, a tooth; *guro*, blackening), is as follows: Water is poured over pieces of iron in a pot and left to stand for a week, in which time the water has acquired a yellow color by the action of the rust. The water thus impregnated with iron is then poured into a cup and heated over a fire. As it begins to boil a wool pen is used to daub the liquid upon the teeth, after which the mouth is rinsed with an infusion of tea. A chemical action between the iron solution and the tea ensues, which stains the teeth black. The process is repeated until the desired degree of blackness is produced.—Y. Makino, Nagoya, Japan.

Anomalous Condition of the Digastric Muscle.—In a dissection of the head and neck, the following-described anomalous condition was noted: The posterior belly of the digastric muscle was missing, and the stylo-hyoid had seemingly taken its place, the fibers of the anterior belly of the digastric being continuous with the fibers of the stylo-hyoid, and the two muscles attached to the hyoid bone by a slip of fascia.—Edwin A. Thayer, Pennsylvania College of Dental Surgery.

A MONTHLY BIBLIOGRAPHY OF DENTAL LITERATURE.

COMPILED BY J. MELVIN LAMB, M.D., D.D.S., WASHINGTON, D. C.

The abbreviations of titles used are those common to bibliographical work, and will, it is presumed, be readily comprehended by any one familiar with dental or scientific publications. Any explanation will be gladly furnished by the compiler. A star (*) indicates a Thesis.

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LIST OF UNITED STATES PATENTS

PERTAINING OR APPLICABLE TO DENTISTRY

ISSUED DURING OCTOBER, 1892.

October 4.—No. 483,807, to Johnston & Browne. Dental chair.
October 11.—No. 484,046, to C. P. Pitman. Rubber-dam.
“ “ No. 484,287, to J. C. Blair. Vapor syringe.
October 18.—No. 484,587, to A. P. Gould. Chair-lift.
“ “ No. 484,747, to L. Stuck. Dental chair.
October 25.—No. 484,800, to N. Kuns. Rubber-dam clamp.
“ “ No. 485,010, to Chas. W. Jones. Dental tool.

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Please send me the **Dental Cosmos** *for 1893, for which find inclosed subscription price*

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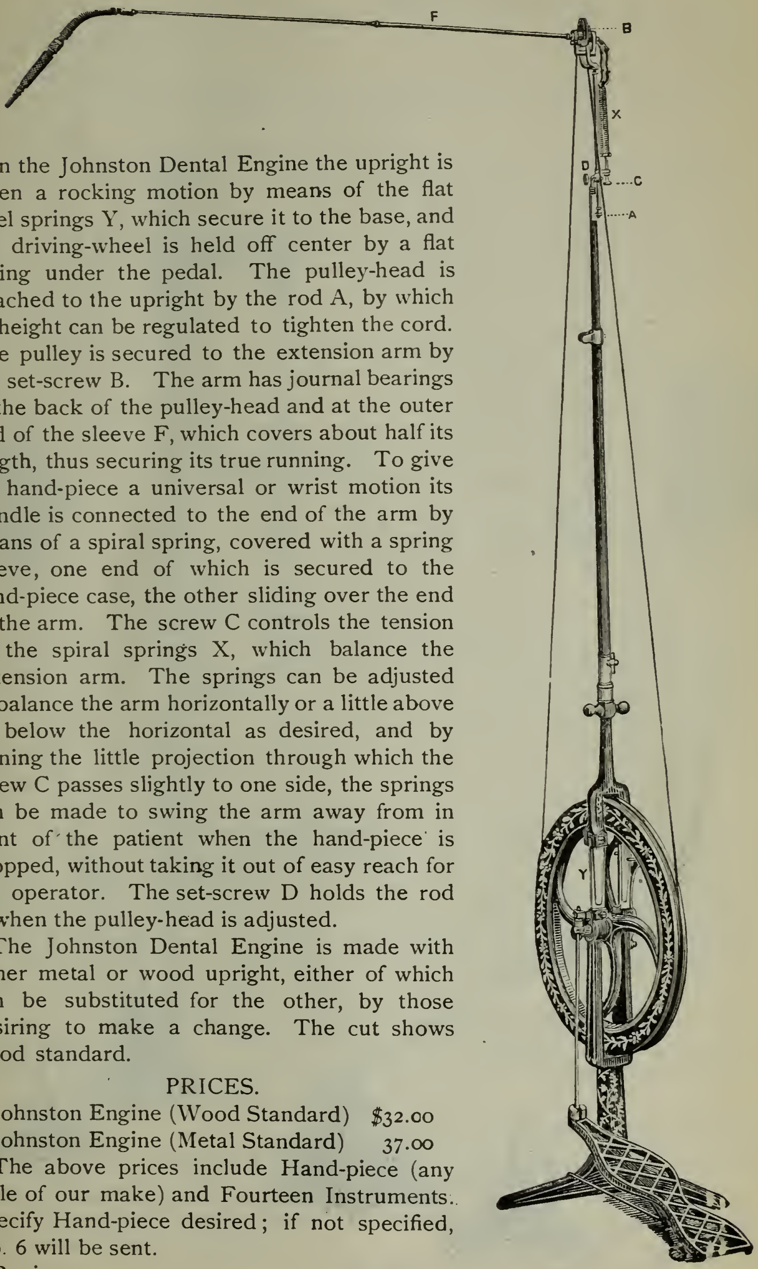
REDUCTION IN PRICE.

JOHNSTON DENTAL ENGINE.

Patented July 6, 1880; July 8, 1884.



In the Johnston Dental Engine the upright is given a rocking motion by means of the flat steel springs Y, which secure it to the base, and the driving-wheel is held off center by a flat spring under the pedal. The pulley-head is attached to the upright by the rod A, by which its height can be regulated to tighten the cord. The pulley is secured to the extension arm by the set-screw B. The arm has journal bearings at the back of the pulley-head and at the outer end of the sleeve F, which covers about half its length, thus securing its true running. To give the hand-piece a universal or wrist motion its spindle is connected to the end of the arm by means of a spiral spring, covered with a spring sleeve, one end of which is secured to the hand-piece case, the other sliding over the end of the arm. The screw C controls the tension of the spiral springs X, which balance the extension arm. The springs can be adjusted to balance the arm horizontally or a little above or below the horizontal as desired, and by turning the little projection through which the screw C passes slightly to one side, the springs can be made to swing the arm away from in front of the patient when the hand-piece is dropped, without taking it out of easy reach for the operator. The set-screw D holds the rod A when the pulley-head is adjusted.

The Johnston Dental Engine is made with either metal or wood upright, either of which can be substituted for the other, by those desiring to make a change. The cut shows wood standard.

PRICES.

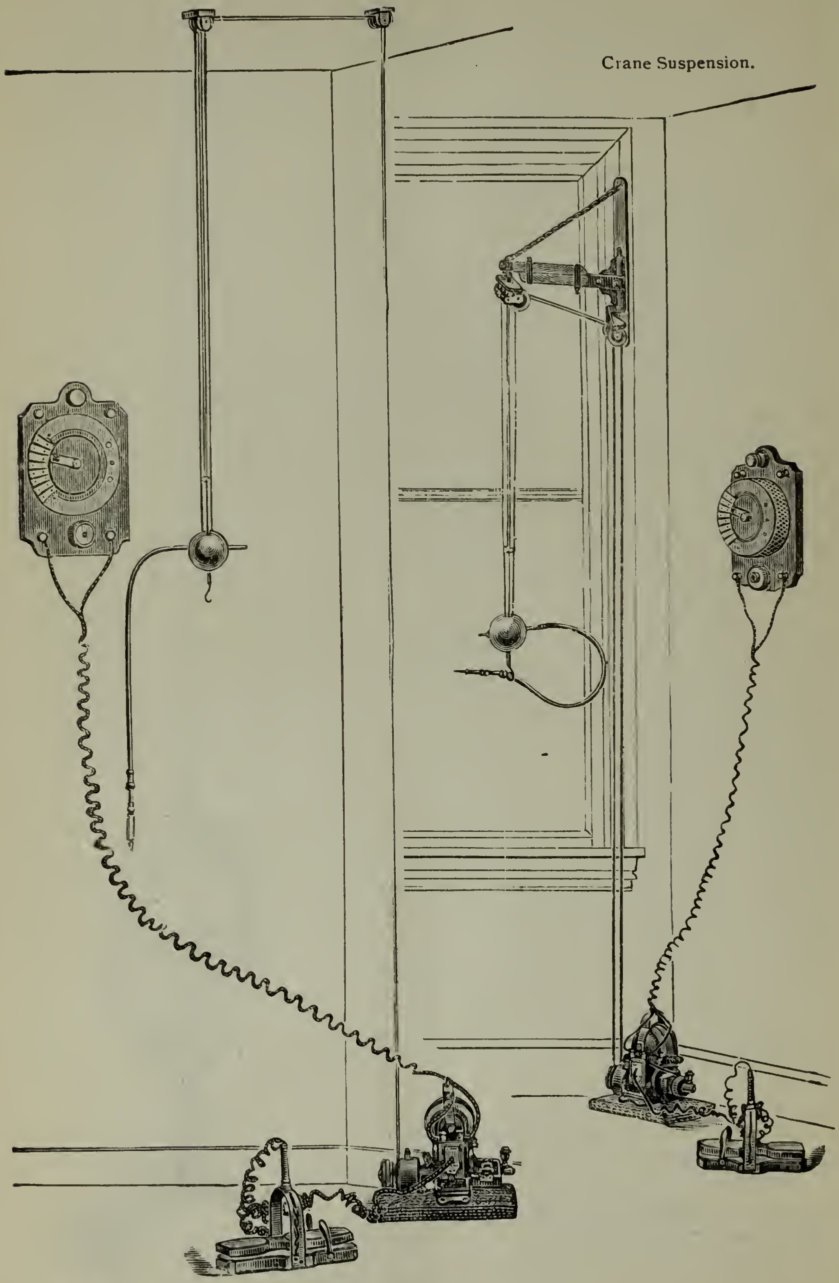
Johnston Engine (Wood Standard)	$32.00
Johnston Engine (Metal Standard)	37.00

The above prices include Hand-piece (any style of our make) and Fourteen Instruments. Specify Hand-piece desired; if not specified, No. 6 will be sent.

Boxing . . . . . . 75 cents.

The Williamson Suspension Dental Engine.

Patented July 8, 1884; Dec. 6, 1887; Dec. 30, 1890; June 2, 1891; June 16, 1891; April 12, 1892.



Ceiling Suspension.

Crane Suspension.

The Williamson Suspension Dental Engine.

The Williamson Suspension Dental Engine combines simplicity and effectiveness. It can be operated by foot-power, water motor, or electrical current, though so far it has been sold only for the last-named. So operated, it harnesses the modern labor-saver—electricity—to the standard dental power transmitter—the S. S. White engine-arm, upon which also it confers all the advantages of the suspension principle.

It is entirely still-running, and it has the absolute freedom of motion inherent to the suspension form, which contributes materially to delicacy of manipulation.

A brief description will show the simplicity of the device. A hollow sphere has a shaft journaled through its center, to which is attached an S. S. White flexible arm. The sphere is parted at the middle by a slip-joint, the two halves being held together by a screw at the bottom. Within one half of the sphere the shaft carries the pulley, the wall of the other half being considerably thickened to serve as a counterbalance to the weight of the arm and hand-piece.

The driving-cord reaches the pulley through two tubes let into the top of the sphere, thence it passes over pulleys at the point of suspension, and from there by means of guide-pulleys to the motor. Attached to the frame of the suspension-pulleys is an adjustable safety-cord (seen in the cuts between the going and returning driving-cord), which runs to the inside of the sphere, for the purpose of sustaining the engine in case of breakage of the driving-cord.

At the bottom of the sphere is a hook to serve as a holder for the hand-piece when not in use. An additional hook (not shown in cut) is furnished, to be attached to the wall at any convenient point to permit the entire engine to be swung out of the way when desired.

The sphere, which is of brass, nickel-plated, is 3¼ inches in diameter, outside measurement. The entire weight of the engine, including sphere, arm, and hand-piece, is about 2 pounds 6 ounces. The Reverse Motor and Treadle are used with this engine (see page 4), and the variable resistance is the same as that used in Nos. 4 and 5 of the Kells system. With these it can be run in either direction at any desired speed, and can be stopped instantaneously by a movement of the foot.

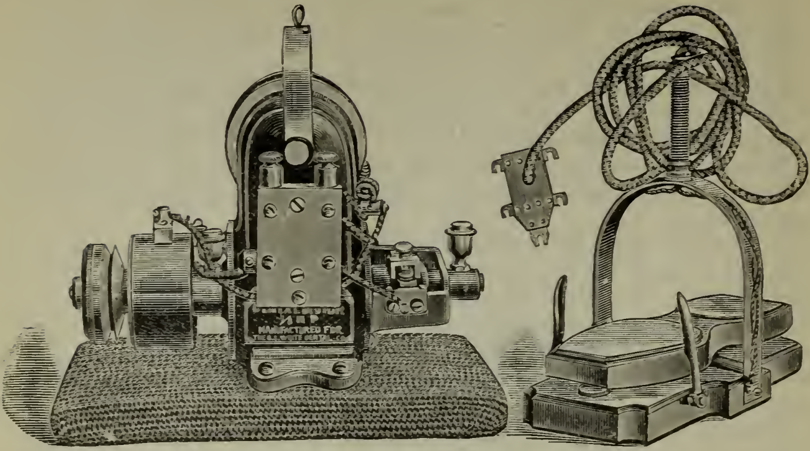
As to the efficiency of a mechanical device, one statement of fact, where it is available, is worth an ocean of claims. The first seven of these engines that were made were placed by the inventor for trial in the offices of as many prominent dentists in Rochester, N. Y., with the distinct proviso in each case that if the trial proved unsatisfactory the engine should be removed without any cost to the dentist. *Not one was allowed to be removed.* Improvements since that time have added greatly to its convenience and efficiency, notably the Reverse Motor and Treadle before referred to.

We illustrate two methods of suspension: from the ceiling, and from a suspension crane. The former is the more desirable, wherever it is practicable; but where there are great difficulties in the way of the adoption of this plan, as a very high ceiling, the crane may be substituted.

PRICES.

Williamson Suspension Engine, including Arm and Hand-piece	$42.00
One 9-foot Two-Way Cord	1.25
Mahogany Single Resistance	26.00
Reverse Motor and Treadle	95.00
Complete for Ceiling Suspension, as shown	$164.25
Suspension Crane	5.00
Pulley Attachment for Suspension Crane	1.50
Complete for Crane Suspension, as shown	$170.75

Reverse Motor and Treadle.



The Reverse Motor and Treadle mark the latest advance in the electric dental engine. In the base of the Treadle is a switch controlled by a sliding rod, which is operated by a metal upright at either side (see cut). With the foot upon the Treadle, bearing down upon the heel closes the circuit; pushing out the right-hand upright gives the engine a forward or right-hand motion; pushing out the left-hand upright reverses the motion and runs the engine backward, to the left; pressing down the toe stops it instantly, in whichever direction it is running.

Attached to the Treadle is a cable 10 feet long, carrying five connecting wires, terminating in an insulated plate having five lugs or arms. To connect with the Motor, slip the lugs into place over the corresponding screw contact points on the plate in front of the Motor, and tighten the screws. It is impossible to get this wrong, as the lugs only fit one way.

The Reverse Motor and Treadle can be used with any of our electrical outfits. The Motor is wound for the 110 volt incandescent electric circuit.

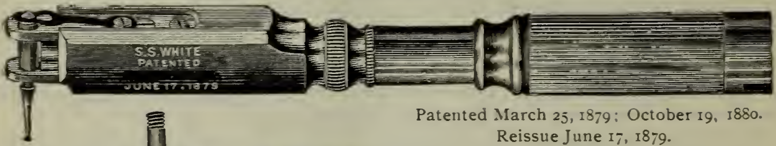
Price: Reverse Motor and Treadle, as shown $95.00

REDUCTION IN PRICE.

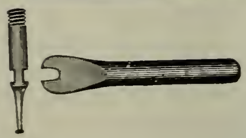
RIGHT-ANGLE ENGINE MALLET.

Suggested by Dr. A. M. HOLMES.

For the Cone-Journal Hand-piece No. 6.



Patented March 25, 1879; October 19, 1880.
Reissue June 17, 1879.



Invaluable where a direct-action plugger cannot be readily used, as it gives all the advantages in filling secured by right-angle attachments in preparing the cavity. Particularly useful in crown, approximal, and buccal cavities of molars and bicuspids.

Price, including six Plugging-points $6.00

Also supplied for Nos. 4, 7, and 8 Hand-pieces. In ordering, state Hand-piece.

100 Leather Polishing Wheels.

Leather Polishing Wheels.

IOO IN A BOX.

For carrying Pumice or other Powders to Clean Teeth or Polish Fillings.

THE S. S. WHITE DENTAL MFG. CO.,
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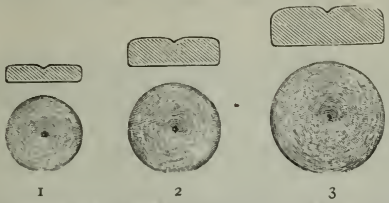
The above is a fac-simile of our label of Leather Polishing Wheels.



Sometimes designated as Moosehide or Hard Buff Polishers.

Put up in boxes of 100. Three sizes.

Price . . . . per box 40 cents.

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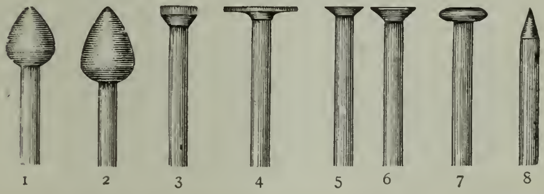

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	" 2	1.25 ;	" 6	.75
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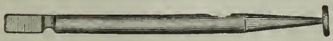
STARTING DIAMOND POINT.



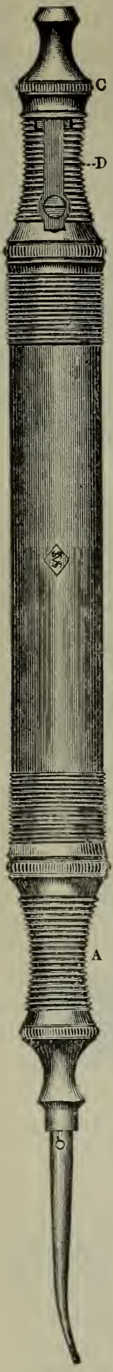
For removing the enamel surface as a starting point in drilling natural or artificial teeth. As it is charged all over, it will also be found excellent in smoothing cavity margins and other uses.

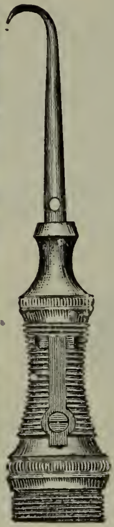
Price . . . . each 75 cents.

In ordering, state for which Hand-piece it is desired.

THE ABBOTT AUTOMATIC MALLET.

Patented in Great Britain and United States.
August 16, 1887.





Two of the most valuable features of the Abbott Mallet are: 1. The blow is always uniformly dead. 2. The force necessary to produce the blow is very little. Consequently the strength and time of the operator are conserved by its use.

It was designed especially to avoid the defects of other appliances of its class. It is simple in construction, and combines with the usual direct blow a back-action movement, actuated by the same mechanism, so that with it gold can be packed into cavities in almost any position in the mouth.

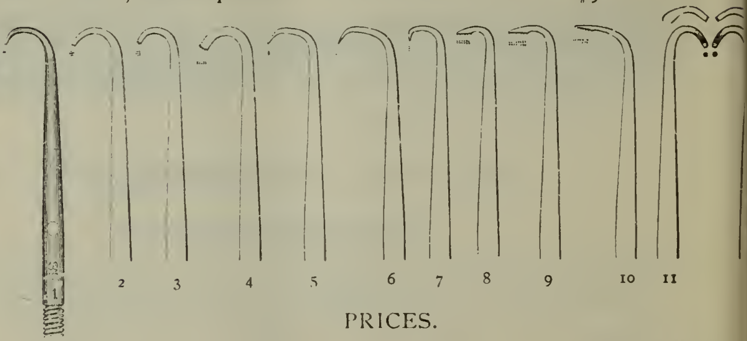
The working parts—pivotal latch, tripping mechanism, hammer, and spring—are entirely free from the case, being carried upon a spindle which passes centrally through it. This plan of construction avoids friction. Each end of the spindle is socketed for the reception of the plugger points, one end giving the direct push or thrust-blow, the other the pull or back-blow.

The Mallet combines simplicity of construction with easy, effective operation.

All the parts liable to wear are made of hardened steel; and the instrument throughout is constructed in the best manner.

For the direct blow the Cone-Socket, Snow & Lewis, or Salmon points may be used, as the Mallet is made with either of the sockets necessary. *Those who wish the Salmon socket will please so specify in ordering, as otherwise we always send the Mallet with socket for Cone-Socket and Snow & Lewis points.* For the back-action blow, Dr. Abbott has devised the set of points shown herewith. It is believed they will cover all requirements.

Price, Nickel-plated $9.00

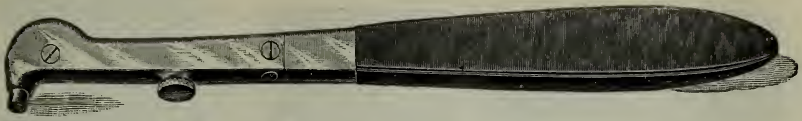


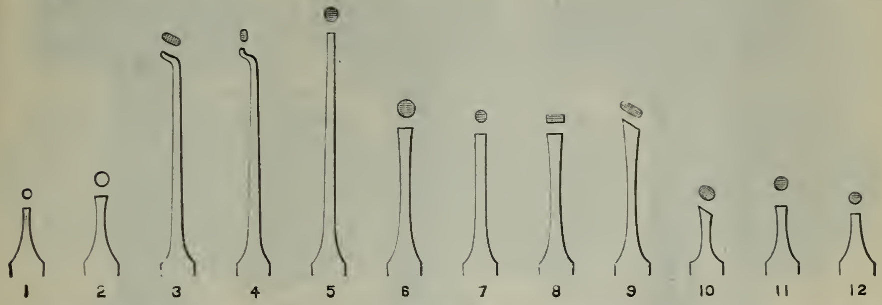
PRICES.

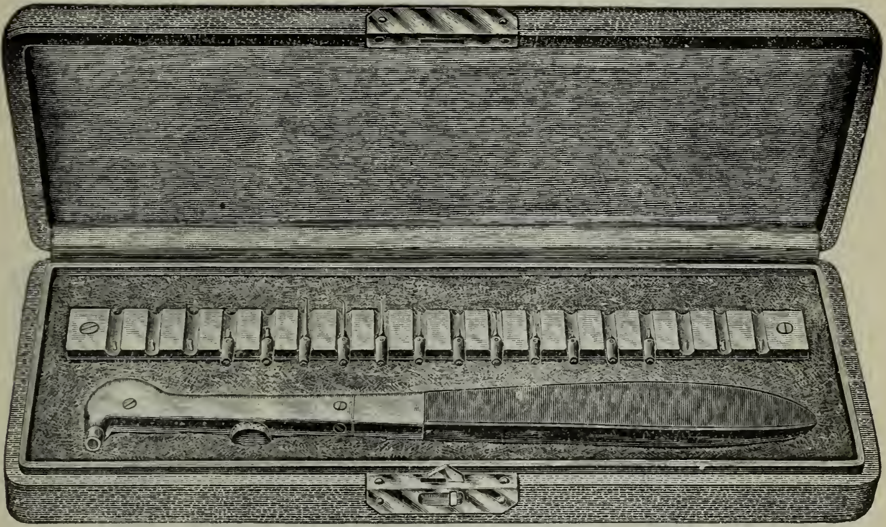
Nos. 1 to 7 inclusive	each	$0.40
" 8 to 12 "	"	.50
Set of 12 Points		5.25

BOSWORTH UNIVERSAL MALLET.

Patented December 15, 1891.







The Bosworth Universal Mallet belongs to the automatic class. Its inventor claims that it is so constructed that with it any tooth-cavity, however difficult of access, may be filled. The blow is struck at an angle to the plane of the handle. The lever spring with which it is equipped produces a sharp, quick blow, without vibration, the value of which is especially seen in filling weak or delicate teeth.

Each Mallet is supplied with twelve points, as shown, which will ordinarily be sufficient for any cavity. Additional points may be ordered if desired. Points Nos. 1 and 2 are designed to take the place of the burnisher upon fillings in cavities difficult of access. It is suggested that the Mallet should not be taken apart, as it may be difficult to reassemble. Oil the plunger which carries the points, once in two or three weeks with best watch oil, work it several times after oiling, and wipe clean. No other part requires lubricating.

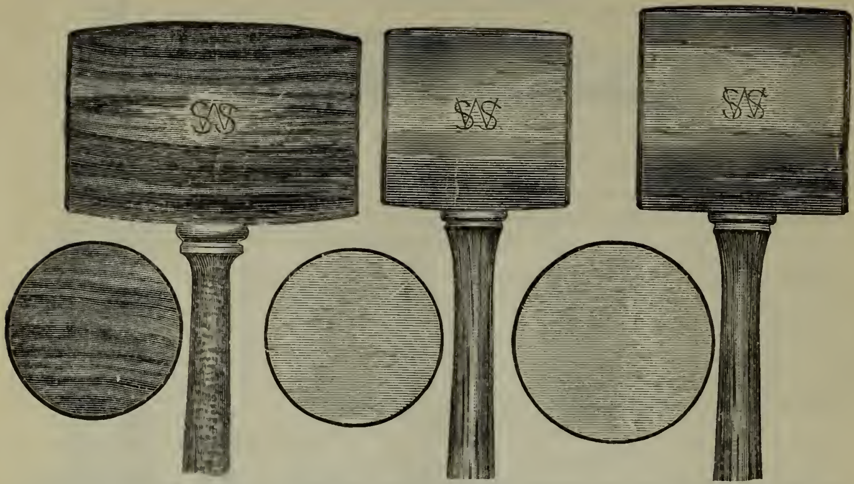
PRICE.

Mallet, complete, with 12 Points, in Morocco Case . .	$20.00
" without Case or Points	14.00

Manufactured by Dr. M. L. Bosworth.

THE S. S. WHITE DENTAL MFG. CO., Sole Agent.

PLUGGING MALLETS.



No. 1.

No. 2.

No. 3.

Lignum-Vitæ or Iron-Wood Head.

Rosewood Handle.

Length, 10½ inches.

Price . . each 30 cts.

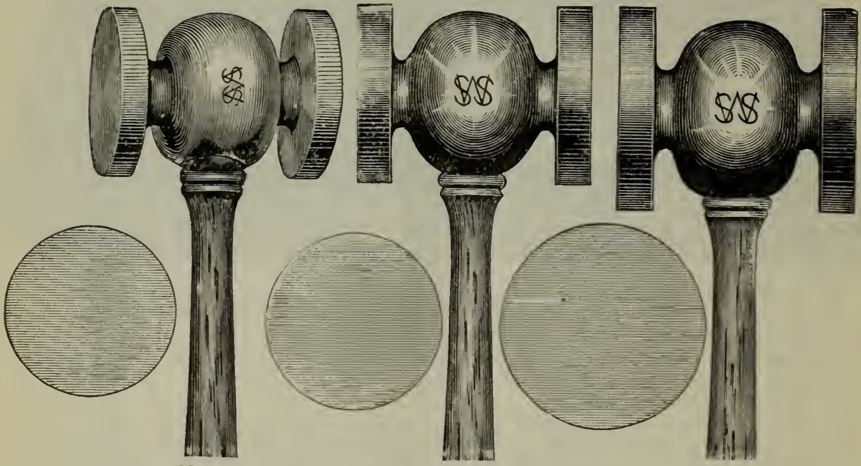
PATENT METAL HEADS.

(Silver-plated.)

Hickory Handles. Weight, 4½ and 6½ ozs. Length, 6¾ and 7¼ inches.

Price . . . . . each $1.25.

FROM DESIGN BY DR. A. B. ROBBINS.



No. 4.
Length, 6½ inches.

No. 5.
Length, 6 inches.

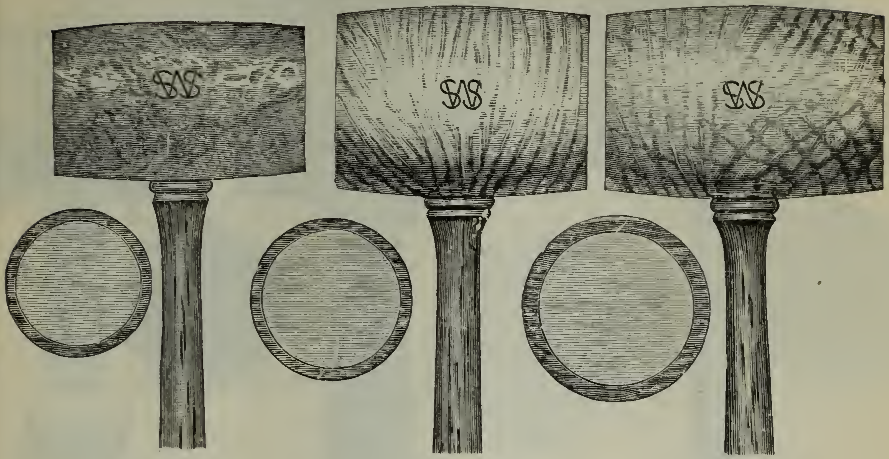
No. 6.
Length, 7¼ inches.

Heads made of Soft Steel. Handles of Heart-Hickory. The best Live-Blow Mallet in the market.

Price . . . . each $1.50

PLUGGING MALLETS.

INVENTION OF DR. CHAS. R. BUTLER.



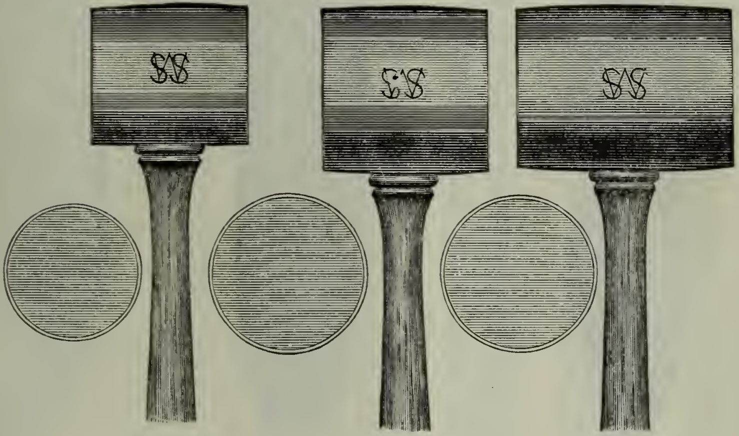
No. 7.
Length, 6½ inches.

No. 8.
Length, 7 inches.

No. 9.
Length, 7¼ inches.

The outer casings are made of thoroughly-seasoned Laurel or Brier Root; the fillings of Composition Metal, and the Handles of Heart-Hickory.

Price . . . . each $1.50



No. 10.
Length, 6¼ inches.

No. 11.
Length, 6½ inches.

No. 12.
Length, 6¾ inches.

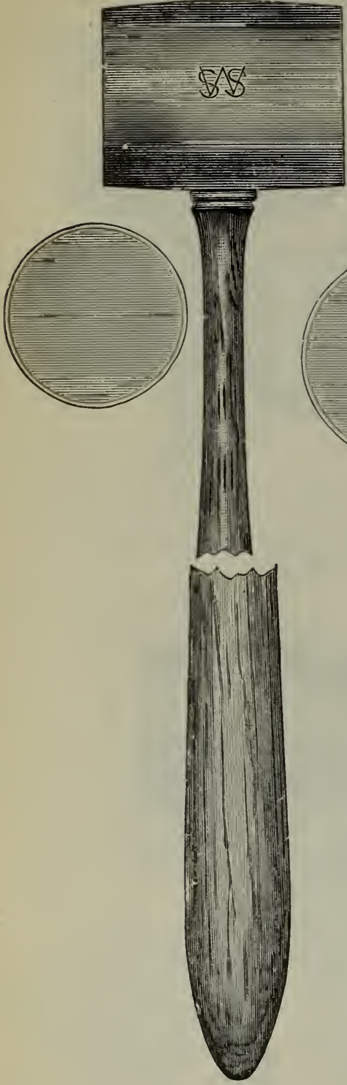
DEAD-BLOW METAL-CASE MALLET.

Nickel-plated. Heart-Hickory Handles. Weights, 2, 3, and 4 ounces respectively.

PRICES.

Nos. 10 and 11	each $1.50
No. 12	" 2.00

PLUGGING MALLETS.



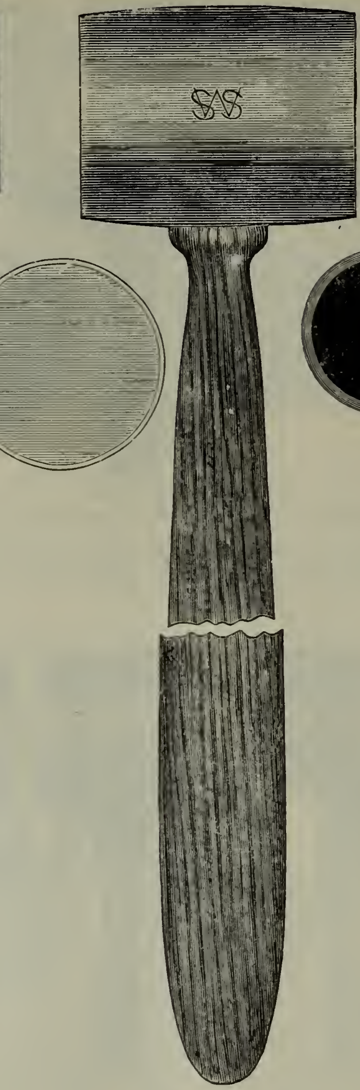
No. 13.

Length, 7 inches.

Dead-Blow
Metal-Case Mallet.

Nickel-plated. Heart-Hickory Handle. Weight 6 ozs.

Price . . . each $2.00



PAT. MAY 31. 70.

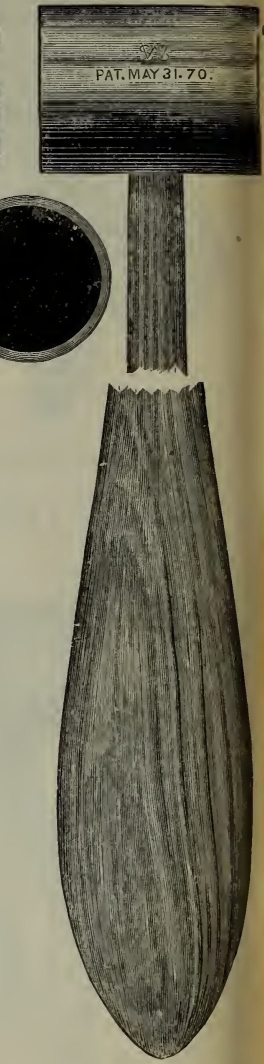
No. 14.

Length, 7½ inches.

Dr. Corydon Palmer's
Metal-Case Mallet.

Nickel-plated. Rosewood Handle. Weight, 6 ozs.

Price . . . each $2.50



No. 15.

Length, 7 inches.

Dr. D. R. Jennings's
Metal-Case Mallet.

Faces covered with leather made very hard. Nickel-plated. Hard Hickory Handle. (Stained.)

Price . . each $2.00

ROLL RUBBER-DAM.

RUBBER DAM
BEST QUALITY
MADE ESPECIALLY FOR
THE S. S. WHITE DENTAL MFG. CO.
PHILADELPHIA.
NEW YORK, BOSTON, CHICAGO, BROOKLYN, ATLANTA.

The Roll Rubber-Dam has several advantages. It is about the proper width, seven inches, for ordinary uses, is quickly and economically cut, and, being sold in cans which are practically air-tight, is preserved without deterioration of quality.

The Dam which we sell is the best on the market.

Put up in yard and half-yard cans. The yard can contains a roll five yards long, the half-yard half that length. The quantities are equal to a yard and half-yard of our regular sheet dam.

PRICES.

Roll Rubber-Dam, Thin, per yard Can	$1.00
" " " " " half-yard Can	.50
" " " Medium, per yard Can	1.50
" " " " " half-yard Can	.75
" " " Thick, per yard Can	2.00
" " " " " half-yard Can	1.00

ABSORBENT COTTON ROLLS.

This dainty form of Absorbent Cotton will be especially appreciated in crown- and bridge-operations, and it will also advantageously replace napkins in examinations and in that large and varied class of brief operations where it seems hardly worth while to apply the dam and clamp.

Absorbent Cotton Rolls can be used wherever loose cotton can be, with this advantage, that no matter whether they are used whole or cut in pieces the edges are smooth and homogeneous, with no "fuzzy" fibers protruding, and at the same time the absorbing capacity equals that of the well-known absorbent cotton. Thus, a roll can be cut in two and the pieces laid over the mouths of the ducts of Steno; a full-size roll can be placed under the tongue with the ends tucked down beside it, or it can be put outside the lower teeth next to the lip and cheeks. In this last position, the roll is also useful as a cushion to guard against painful pressure on the lower lip in some operations on the upper teeth.

The Absorbent Cotton Rolls are 6 inches long, and of four diameters, about ⅞-in., ¾-in., ½-in., and ¼-in. Cut is about half size.

Price, put up in boxes, 50 Rolls, assorted sizes . . 50 cents.

RUBBER-DAM CLAMPS.

SET OF 6, ORIGINAL ALLAN.—PLAIN.

1

2

3

4

5

6

40 cents each.

SET OF 6, ORIGINAL ALLAN.—SERRATED.

7

8

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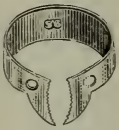
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DR. CHARLES F. ALLAN'S MOLAR CLAMPS. H. C.

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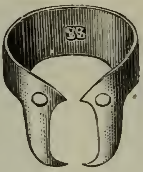
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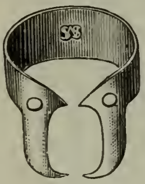
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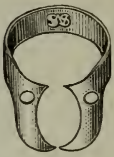
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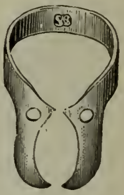
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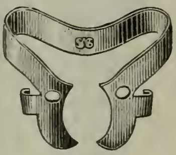
40 cents each.

DR. DELOS PALMER'S SET OF 8.

18

19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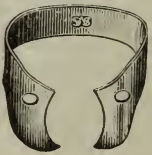
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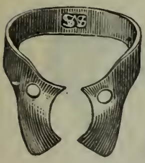
25

40 cents each.

RUBBER-DAM CLAMPS.

Dr. Tees's Festooned.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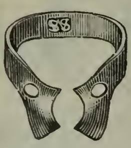
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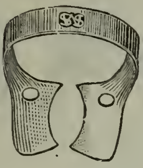
Dr. Tees's Broad Flange.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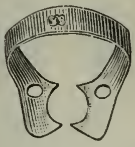
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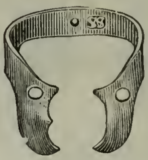
Dr. W. W. Evans's
Beaked Molar.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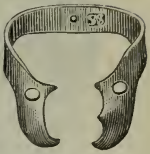
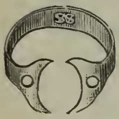

31

40 cents each.

Dr. Huey's.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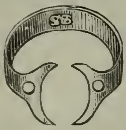
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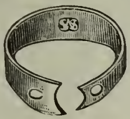
Small Irregularity.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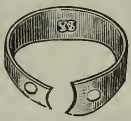
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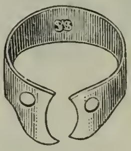
Irregularity.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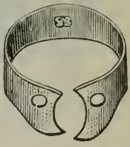
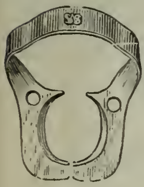

37

40 cents each.

SET OF 9, REACH-AROUND.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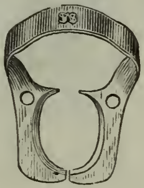
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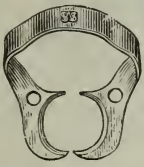
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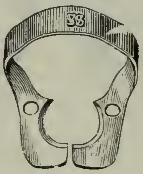
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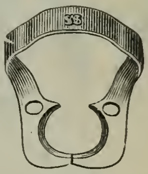
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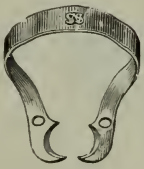
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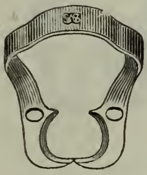
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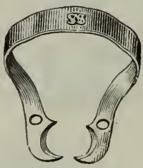
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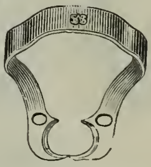
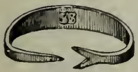

46

40 cents each.

Dr. Jno. W. Holt's.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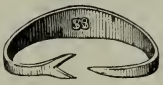
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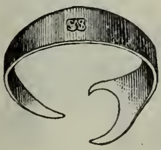
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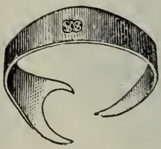
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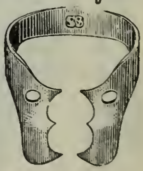
Dr. J. W. Lyder's.


51

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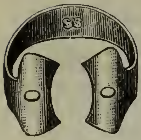
RUBBER-DAM CLAMPS.

Dr. H. C Longnecker's.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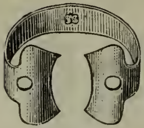
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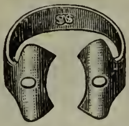
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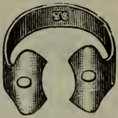
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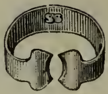
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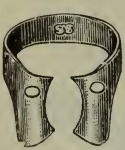
Dr. H. C. Longnecker's "Back Set."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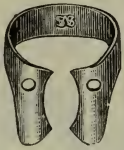
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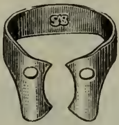
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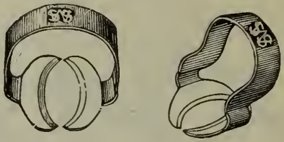
40 cents each.

Dr. Southwick's.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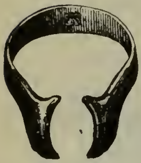
Dr. E. C. Moore's.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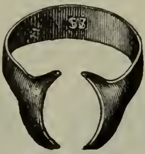
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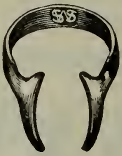
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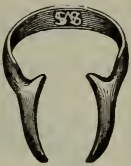
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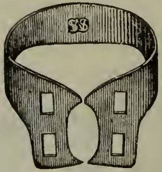
Dr. W. St. Geo. Elliott's.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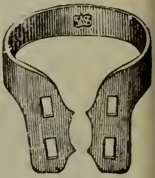
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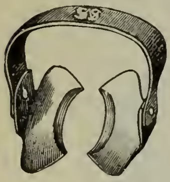
DR. W. E. BUCKMAN'S.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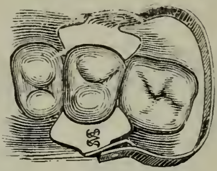
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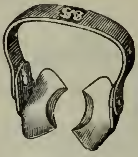
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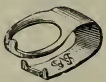
80 cents each.

Dr. J. F. P. Hodson's.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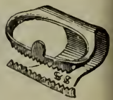
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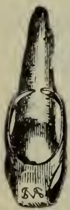
80 cents each.

Dr. W. W. Evans's "Incisor and Bicuspid."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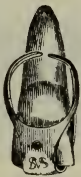
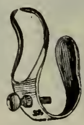

73

80 cents each.

Dr. W. W. Evans's "Incisor and Bicuspid" with Set Screw.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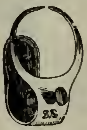
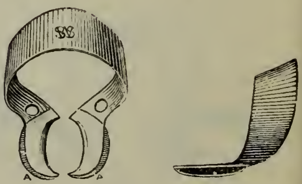

75

$1.00 each.

Dr. Hickman's.

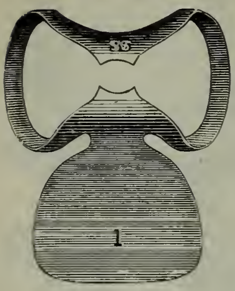


76

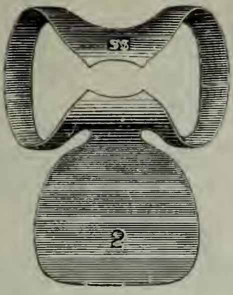
90 cents each.

RUBBER-DAM CLAMPS.

C. BANCROFT'S PATENT. (No. 151,265, May 26, 1874.)



77



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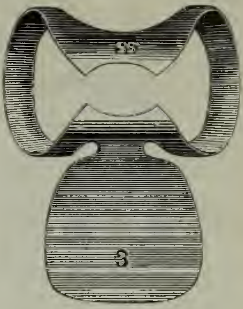
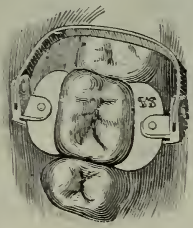


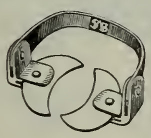
79

$1.25 each.

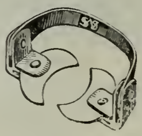
DR. L. YNCHAUSTI'S.



80



81



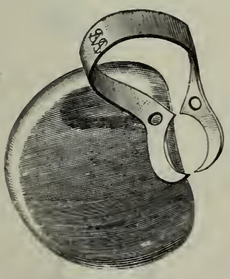
82

$2.00 each.

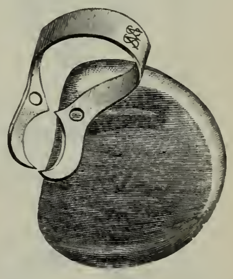
RUBBER-DAM CLAMP WITH TONGUE-GUARD.

Suggested by Mr. Claude Rogers.

No. 83.



No. 84.



This pattern of Rubber-Dam Clamp is especially adapted for crown cavities, and for under approximal or buccal cavities which do not extend to the cervical margin. It was originally designed by Mr. Rogers in order to dispense with rubber-dam or napkins in certain cases. He uses it on the naked tooth, with saliva pump and pad of bibulous paper on the parotid duct. He has found it especially useful in the mouths of children. He claims that with this Clamp alone a tooth may often be kept dry for over an hour.

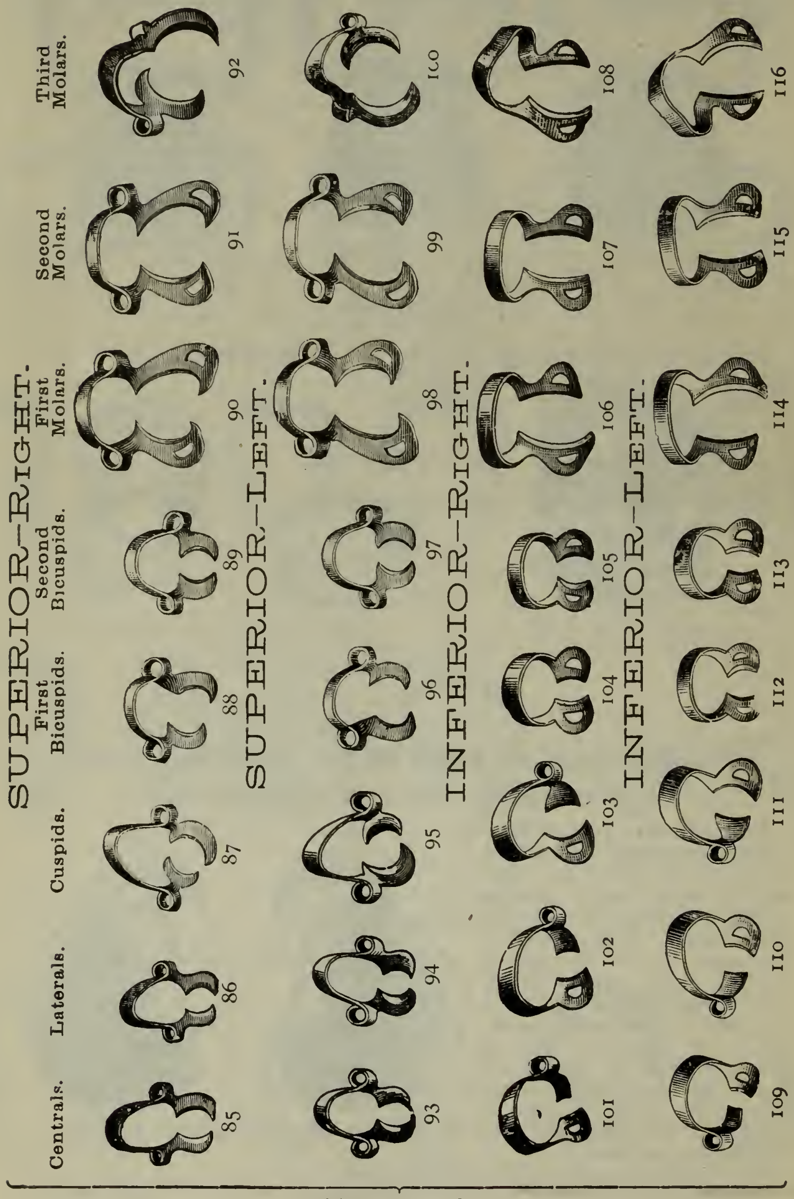
Made in pairs, right and left. Nickel-plated.

Price . . . . each $1.00

RUBBER-DAM CLAMPS.

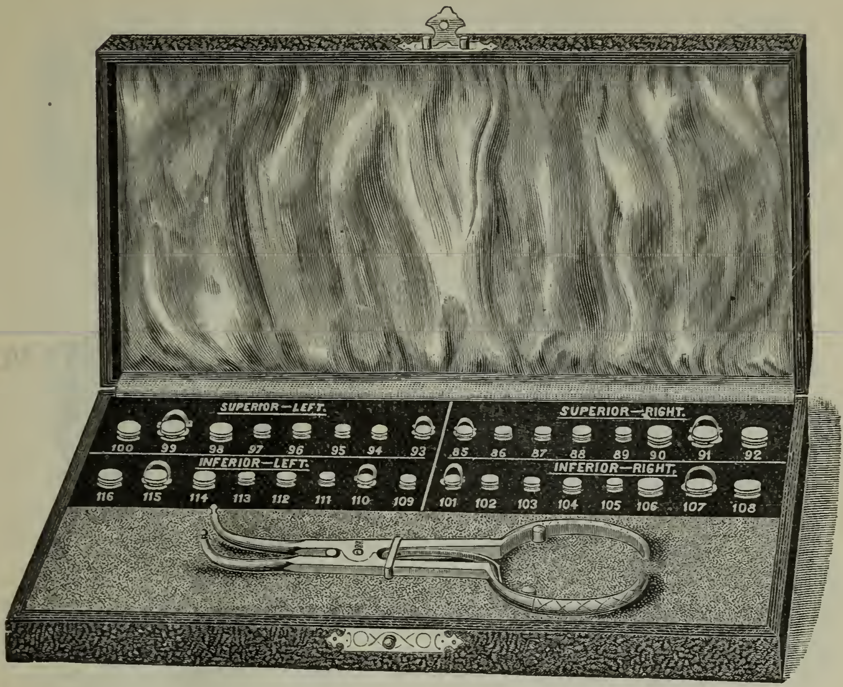
DR. DELOS PALMER'S SET OF 32.

Patented June 22, 1875.



60 cents each.

CASE FOR PALMER'S SET OF THIRTY-TWO CLAMPS.



A complete set of Palmer Clamps is not merely a thing of beauty and a joy forever to the dentist. It is as well a delight to his patients.

To make selection easy and provide a neat way of keeping the Palmer set, we make the Case shown. Each Clamp has its appropriate little wooden peg, labeled and numbered to correspond with the numbers on the Clamps, and there is a place also for the Forceps. The pegs are made of appropriate sizes for the Clamps they are to hold.

The Case is leather-covered, lined with satin and velvet. We also supply a plain pasteboard box, with the same arrangement for holding the Clamps.

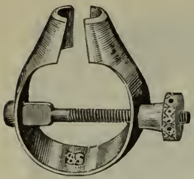
PRICES.

Morocco Case, lined with Satin and Velvet	$3.50
The same, with set of Thirty-two Clamps and Palmer's Nickel-plated Forceps	25.00
Pasteboard Box, containing the same arrangement for the Clamps	1.50
The same, with set of Thirty-two Clamps and Palmer's Nickel-plated Forceps	23.00

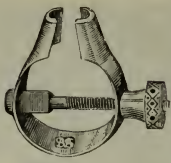
Substituting the Universal Clamp Forceps for the Palmer adds 50 cents to the price of complete set.

ROOT-CLAMPS FOR CROWN-WORK.

Suggested by Dr. E. L. HUNTER.



No. 118.



No. 119.

After the thumb-screw is adjusted so that the Clamp slides easily over the root, the points are passed through the proper opening in *thin* rubber-dam, carried well under the gum and secured firmly with the thumb-screw. The dam is next adjusted over the adjoining teeth, carried beyond the cone-shaped ends of the Clamp with a waxed silk ligature and tied there; after which the Clamp is removed, leaving the dam in position.

Price . . . . each $2.00

T. A. LONG'S RUBBER-DAM CLAMPS.

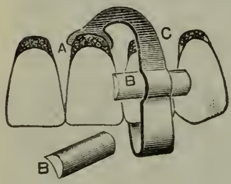
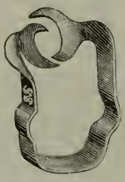
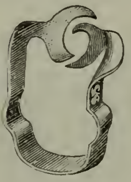


FIG. 1.



120



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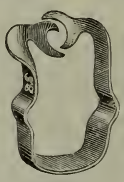
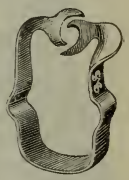


122



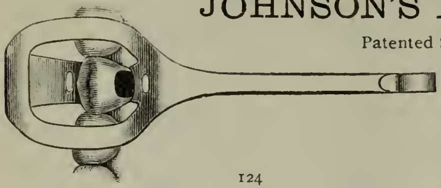
123

Specially designed to push and hold the rubber-dam clear beyond the margins of labio-cervical cavities. They are in pairs, and are applicable to all the teeth except the molars. Fig. 1 shows the method of use. B is a block, cut to suit, which holds the jaw of the Clamp firmly beyond the cavity A. The larger pair are for centrals and cuspids; the smaller for laterals and bicuspids.

Price . . . . each 50 cents.

JOHNSON'S LEVER CLAMPS.

Patented September 20, 1887.



124

For use in filling cavities which extend under the gum margins of incisors, cuspids, and bicuspids. The side of the Clamp is elongated to form a lever. A tongue or clasp engages with the point of the tooth, and a gum-retractor projecting from the body of the Clamp pushes the gum above the cervical margin of the cavity, at the end of which is a loop through which an elastic ligature is passed, being fastened around the patient's head or neck. The inventor claims that the Clamp is easily adjusted without disturbing the gum except at the point where the work is to be performed, where the Clamp acts as a protector. The lever holds the lip out of the way.

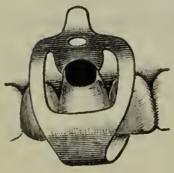
Price . . . . each $1.00

NOTE.—The Lever Clamp is best applied by means of the Universal Rubber-Dam Clamp Forceps.

HOW'S CERVIX CLAMP.

Patented May 1, 1888.

125

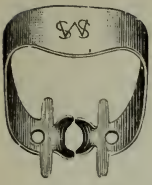


For holding back the gum from cavities in the tooth-neck. The Clamp is best adjusted and removed by the Universal Rubber-Dam Clamp Forceps, but it may be placed upon the tooth, and the cavity be clearly exposed without them by passing loops of twine through the clamp holes, and using both hands to pull the Clamp open.

Price . . . . . each $1.00

ROOT CLAMPS FOR CROWN-WORK.

Devised by Dr. OTTOLENGUI.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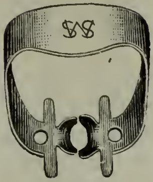
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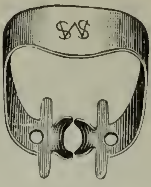
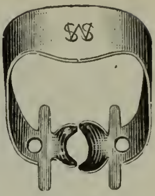
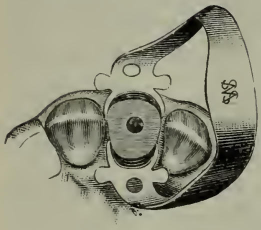
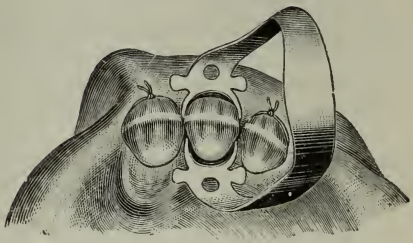

No. 128.


No. 129.





The set consists of two pairs, designated respectively Nos. 126, 127, 128, and 129 of our set. No. 126 for upper left lateral and bicuspids, or lower right incisors and bicuspids. No. 127 for upper right lateral and bicuspids, or lower left incisors and bicuspids. No. 128 for upper left central and cuspid, or lower right cuspid. No. 129 for upper right central and cuspid, or lower left cuspid.

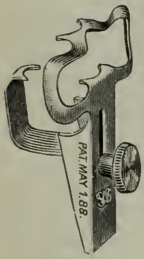
The rubber-dam is first stretched over the clamp lugs, permitting a view of the root on which the Clamp is to be placed, and then pushed well under the gum.

The facility of access to the root which these Clamps permit is well shown in the illustrations, which are from Dr. Ottolengui's article in the DENTAL COSMOS, December, 1888, page 931.

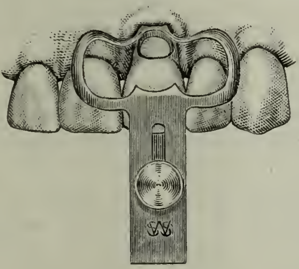
Price . . . . each $1.50

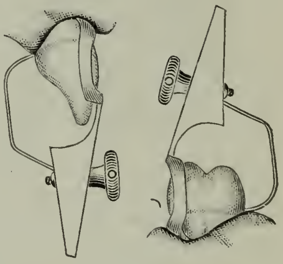
DR. HOW'S CERVIX SCREW CLAMP.

Patented May 1, 1888.



No. 130.





The simple Cervix Clamp, No. 125, having met with general approval, is supplemented by this modification, No. 130, which has a wider range of application, being capable of firm screw adjustment upon any of the upper or lower oral teeth, including the bicuspids.

The illustrations show the Clamp in position on an upper central and a lower bicuspid, the cavity in each extending far beyond the normal gum margin.

Price . . . . each $2.25

Description of Rubber-Dam Clamps.

Nos. 1 to 12.—*Dr. Chas. F. Allan's Original Patterns.*—Nos. 1 to 6, plain edges. Nos. 7 to 12, serrated edges. Designed for general use, the range of sizes being sufficient for all teeth.

Nos. 13, 14, 15.—Especially designed by *Dr. Chas. F. Allan* for use on lower molars, the inside edges of the Clamp being shaped to conform to the necks of these teeth. They have great back-set, entirely clearing the tooth on which they clamp, and broad flanges to keep the rubber spread.

Nos. 16, 17.—The *H. C.* Clamps, for ladies' and children's molars.—Light, small, and very elastic. They have good back-set and well-spread flanges, affording easy access to any cavity in the tooth they are clamped on. The small hoop allows an easy "open" to the patient, and enables a very light Clamp to hold the dam down securely without pain.

Nos. 18 to 25.—*Dr. Delos Palmer's Set of Eight.*—Nos. 18 and 19, Universal Clamps for Molars. No. 20, for posterior cavities in molars standing alone. No. 21, for third molars, or any molar of a cone shape. This Clamp can oftentimes be turned around while on the tooth, so as to place the hoop out of the way of the operator. No. 22, for bicuspids. No. 23, for lateral or central incisors. Nos. 24 and 25, *Rights and Lefts*, for cavities under the gum on the buccal or lingual surface of molars.

Nos. 26, 27.—*Dr. Ambler Tees's "Festooned."*—For molars and bicuspids which have deeply festooned gums.

Nos. 28, 29.—*Dr. Ambler Tees's "Broad Flange."*—For molars and bicuspids. The broad flanges are intended to spread the dam wide.

Nos. 30, 31.—*Dr. W. W. Evans's "Beaked Molars."*

Nos. 32, 33.—*Dr. Robert Huey's "Dens Sap."*—For very difficult cases to which other Clamps are inapplicable.

Nos. 34 to 37.—For teeth requiring one side to be smaller than the other.

Nos. 38 to 46.—*"Reach-Arounds."*—Designed for isolated teeth, or wherever the dam requires to be held down between teeth in a space caused by removal. On wisdom-teeth they may be used with the hoop placed forward to compress the dam behind the tooth, in addition to retaining it as a clamp. Nos. 43 and 45 are also serviceable on bicuspids and incisors for holding the dam out of the way of the operator, their long back-set favoring this application.

Nos. 47 to 50.—*Dr. John W. Holt's.*—For labial cavities low down upon the neck of a tooth. These Clamps can be applied without pain, whenever there is a clear spot beyond the cavity on which the single point can be put, the Clamp being steadied by the prongs, or two points, of the inner end.

No. 51.—*Dr. J. W. Lyder's.*—Resembles the Tees Festooned and Evans Beaked Molar, differing from the latter only in having beaks on both flanges.

Nos. 52 to 59.—*Dr. H. C. Longnecker's.*—The forms are such that the dam may be put over the teeth and low down on the necks with certainty and ease, and because of the recurvature of the flanges they will not hurt the festoons of the gums, and will yet retain position firmly under hard pressure. Nos. 52 to 56, with straight hoops, must often be unavailable for the tooth to be operated on, but, by reason of the small "open" required, may be placed on back teeth, and also on the tooth in front. Dr. Longnecker claims for them peculiar usefulness in approximal fillings, in that they permit the finishing of the filling, with dam and Clamp on, more nearly to completion than any other Clamp. Nos. 57, 58, 59, the same general shape of beaks as 52 to 56, but with back-set hoop.

No. 60.—*Dr. A. P. Southwick's.*—To all the advantages of Dr. Huey's Dens Sap. Clamp, Dr. Southwick has added in this improved Clamp a recess for the forceps points and so much back-set in the hoop as allows much freer access for filling than the straight band.

Nos. 61 to 64.—*Dr. E. C. Moore's.*—Dr. Moore says that these will get down, and stay firmly as placed, better than any other Clamp he has tried or made. Their closeness of adaptation and perfect smoothness, which, with their great stiffness, permit rigid maintenance in place with very little pain and no injury to the tooth, will be known fully only to those who use them.

Nos. 65, 66.—*Dr. W. St. George Elliott's.*—Designed for molars. After inserting the four studs on the beaks of the forceps through the perforations in the Clamp, the rubber-dam is to be strained over the studs under the Clamp. The Clamp is then adjusted upon the neck of the tooth, and the forceps disengaged, when the rubber will slip under the Clamp up to the neck of the tooth. It will, however, usually lodge on the crowns of adjacent teeth, until the operator, by a slight stretching motion of the rubber across the mouth, causes it to slip between them.

Nos. 67, 68, 69.—*Dr. W. E. Buckman's Plain Hinged Clamps.*—Designed to meet a want for a Clamp the hoop of which can be turned down so as to permit of work at the tooth on which it is placed.

Nos. 70, 71.—*Dr. J. F. P. Hodson's.*—For labial or buccal gum cavities.

Nos. 72, 73, 74, 75.—*Dr. W. W. Evans's.*—These Clamps are designed for use in filling labial surfaces of incisors, cuspids, and bicuspids, when the cavity is close to or under the margin of the gum. They can be put on without the aid of forceps, as the peculiar shape of the beak adjusts it to the lingual surface of the tooth, and it has sufficient spring to retain its position in most cases. Made in two sizes, and with or without regulating screw. The screw is to tighten the hold when the Clamp does not fit securely.

No. 76.—*Dr. F. Hickman's.*—Made with a double lip, forming a clear space for the rubber to be lodged in before applying to the tooth. Punch the rubber, put it on the Clamp by stretching it over the lip and allowing it to fall into the recess; apply Clamp and rubber, spreading both together; after which stretch the rubber out of the recess, or free space, and allow it to close on the neck of the tooth. Especially adapted to teeth which are spurred and jagged, or broken down low on one side.

Nos. 77, 78, 79.—*C. Bancroft's.*—Patented May 26, 1874. Combined Rubber-dam Clamp and Tongue-holder. Used with rubber-dam or napkin; convenient where the tongue obstructs the sight or interferes with the work.

Nos. 80, 81, 82.—*Dr. L. Ynchausti's Hinged and Jointed Clamps.*—The beaks are set in the grooves of the joints and work independent of the hoop, which is also hinged in another groove of the joint.

Nos. 83, 84.—Are described with the illustrations.

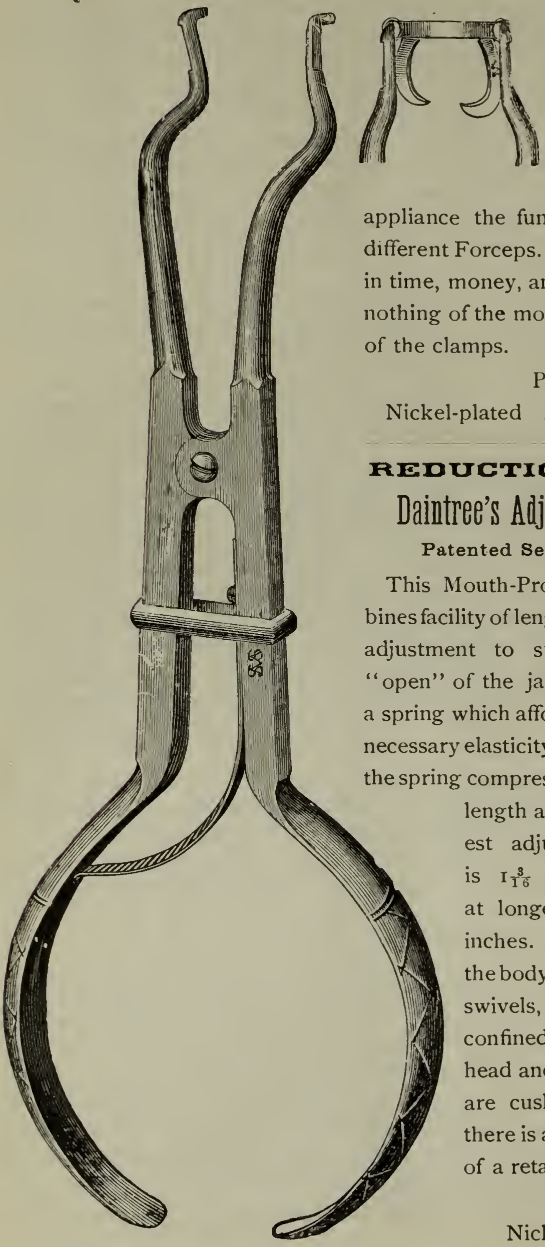
Nos. 85 to 116.—*Dr. Delos Palmer's Set of Thirty-two.*—Patented June 22, 1875. Designed for every tooth in the upper and lower jaws. Taft's "Operative Dentistry" says of these Clamps, "The profession is largely indebted to Dr. Delos Palmer for the most efficient clamps that have been in use for several years, and wholly indebted to him for the very perfect set represented." The late Marshall H. Webb used this set largely. In his "Notes on Operative Dentistry," he says, "The most complete, satisfactory, and useful, and those causing the patient the least pain, are the set of thirty-two (a special clamp for each separate tooth) devised by Dr. Delos Palmer."

Nos. 118 to 130 are described with the illustrations.

THE BREWER UNIVERSAL FORCEPS

FOR RUBBER-DAM CLAMPS.

Patented April 14, 1885.



By reason of its ready adaptability to almost all the forms of Rubber-Dam Clamps made, the Brewer Universal affords in one appliance the functions of two or three different Forceps. It is thus an economy in time, money, and drawer-space, to say nothing of the more satisfactory handling of the clamps.

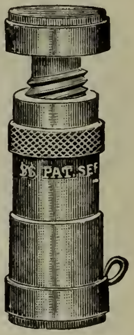
PRICE.

Nickel-plated . . per pair	$3.00

REDUCTION IN PRICE.

Daintree's Adjustable Mouth-Prop.

Patented September 10, 1889.

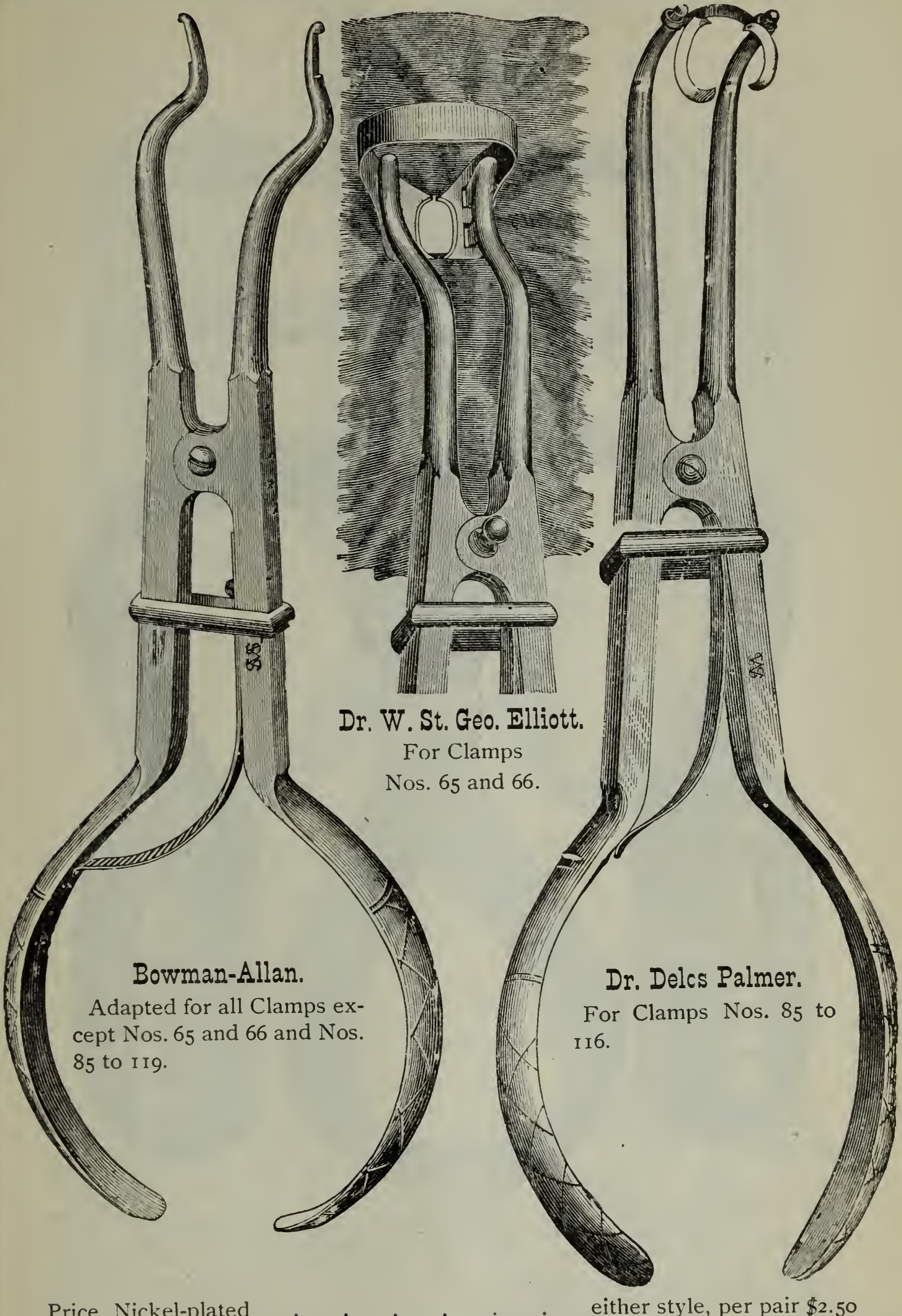


This Mouth-Prop combines facility of lengthwise adjustment to suit the "open" of the jaws with a spring which affords the necessary elasticity. With the spring compressed the length at shortest adjustment is $1\frac{3}{16}$ inches; at longest, $1\frac{1}{2}$ inches. One head screws into the body, around which the other swivels, an elastic spring being confined between the swiveling head and the body. The heads are cushioned with cork, and there is a ring for the attachment of a retaining cord.

PRICE.

Nickel-plated .	$0.75

RUBBER-DAM CLAMP FORCEPS.



Bowman-Allan.
Adapted for all Clamps except Nos. 65 and 66 and Nos. 85 to 119.

Dr. W. St. Geo. Elliott.
For Clamps
Nos. 65 and 66.

Dr. Delcs Palmer.
For Clamps Nos. 85 to 116.

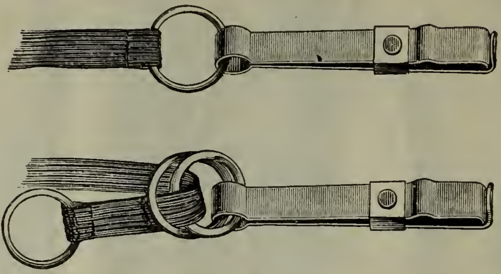
Price, Nickel-plated . . . . either style, per pair $2.50

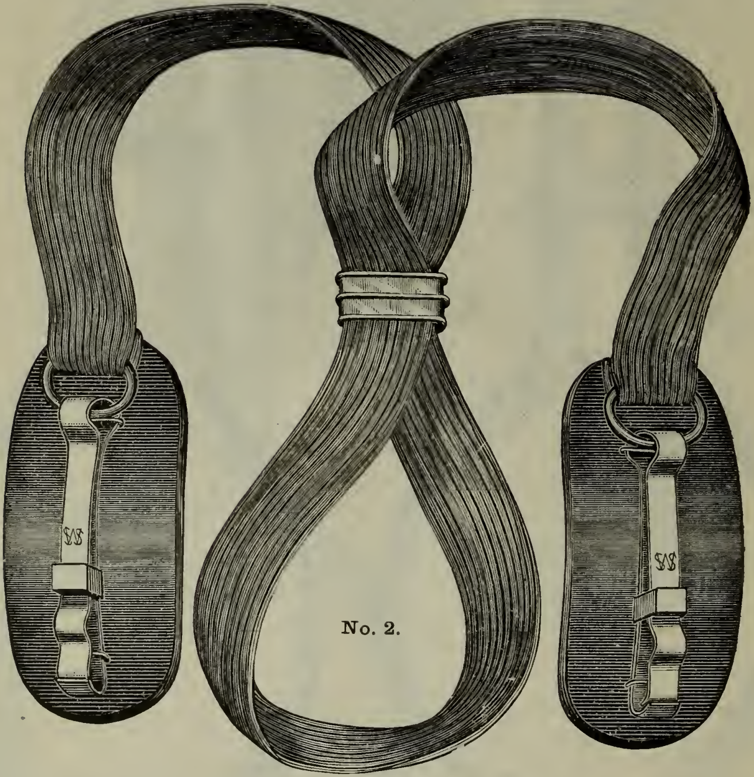
Ligatures may be applied with the Elliott Forceps by looping them over the studs on the Forceps points, then passing them through the hole in the joint-screw and taking a turn around its neck, and then expanding the Forceps.

Rubber-Dam Holders.

Design of Dr. Cogswell.

No. 1.



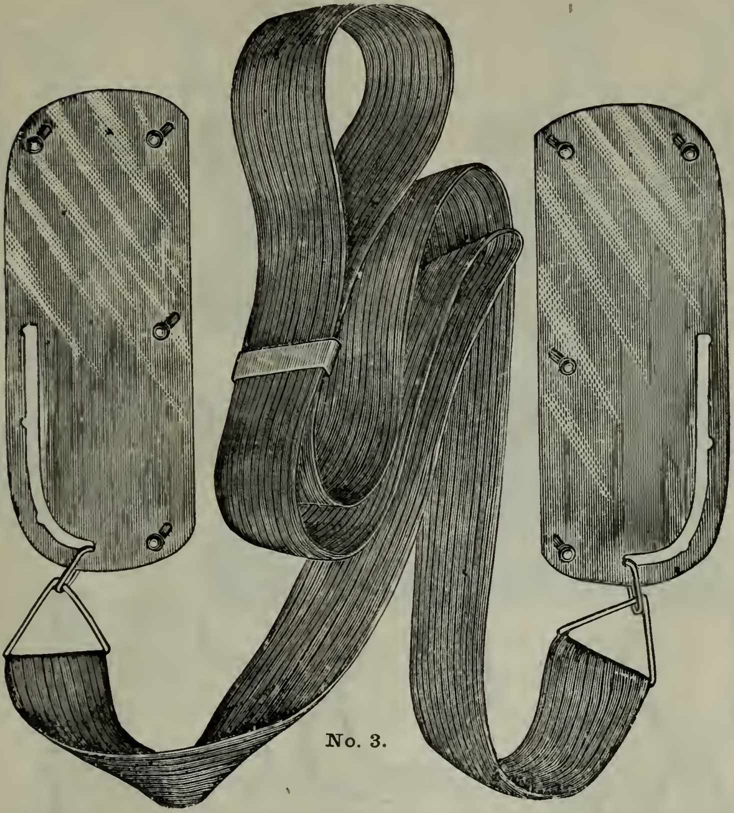


No. 2.

No. 1.	Plain, Narrow Cotton Gum Braid	each	$0.60
" 2.	Buffalo-Horn Guards, Wide Cotton Gum Braid, with Slide	"	1.00
" 2.	Buffalo-Horn Guards, Wide Silk Gum Braid, "	"	1.10
" 2.	Ivory Guards, " " " " "	"	1.50
Narrow Gum Braid for Holder No. 1 (18 inches)			.10
Wide " Cotton, for Holder No. 2 (18 inches)			.10
" " Silk, " " 2 "			.20
Slides, Nickel-plated		each	.12

Improved Rubber-Dam Holder.

Invention of Dr. S. G. PERRY.



The plates are bending metal, so that they may be adapted to the shape of the cheek. The dam is caught up on two of the projecting studs and strained smooth while being firmly held.

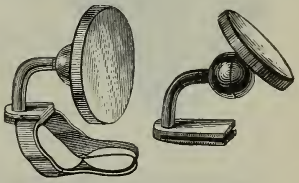
With the sliding buckle the elastic band may be adjusted easily. This buckle can be moved to any part of the band.

Price, No. 3, with Cotton Gum Braid	. . . . . .	$1.00
" " ", Silk "	. . . . . .	1.10

REFLECTORS.

Patented February 16, 1875.

These little Mirrors are attached to the clamp in the manner shown in the left-hand cut, and a ball-and-socket joint permits them to be turned so as to concentrate the light upon the cavity or any portion of the mouth required. The operator thus has all the advantages of a mouth-mirror without the trouble of holding it, both hands being free for manipulation. The appliance is especially useful in operations upon posterior cavities in molars.

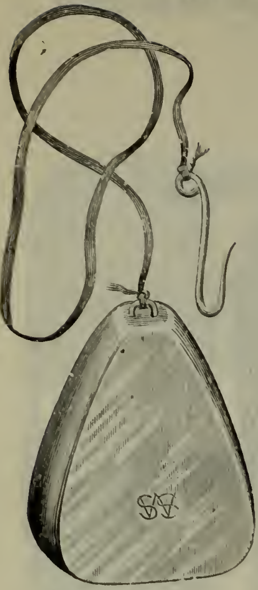


Two sizes, respectively half-inch and five-eighths inch in diameter, either plain or magnifying.

PRICES.

Either size, Plain Glass	. . . .	$2.00
" " Magnifying Glass	. . . .	2.50

RUBBER-DAM WEIGHTS.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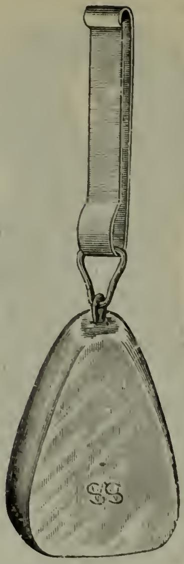
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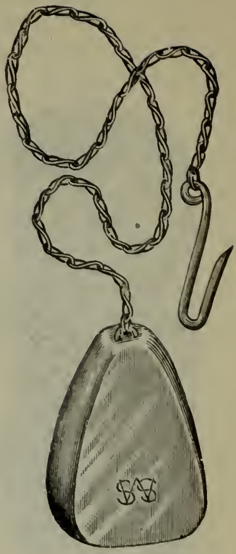
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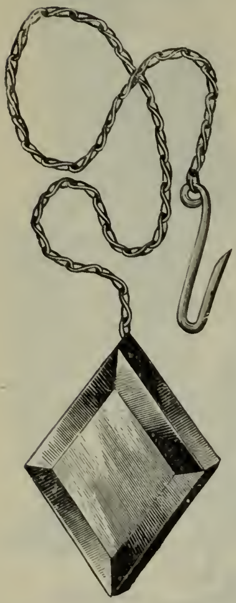
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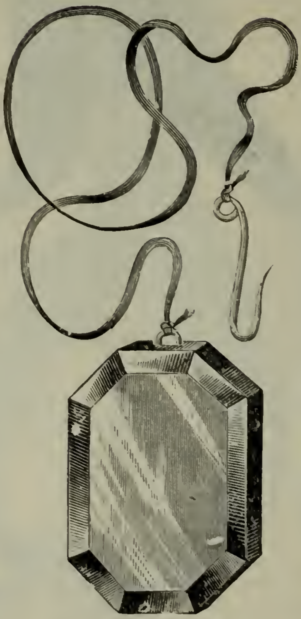
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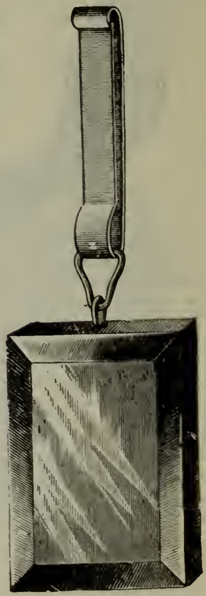
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Made of Brass, Nickel-Plated, with Silk Braid, Chain, or Spring Clip.

PRICES.

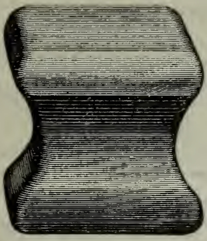
Nos. 1 to 6, with Silk Braid and Hook	each 35 cents.
" " " Nickel-plated Chain and Hook . .	" 40 "
" " " " Spring Clip	" 50 "

SOFT RUBBER BITE-BLOCKS.

Patterns supplied by DR. S. H. GUILFORD.

The four Soft Rubber Bite-Blocks illustrated herewith, besides affording a variety of sizes sufficient to cover all requirements, have the following advantages :

1. Being elastic, they cannot injure the frailest tooth by being bitten upon.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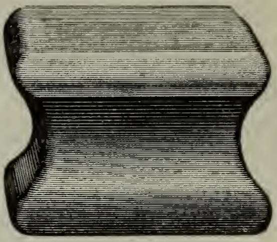
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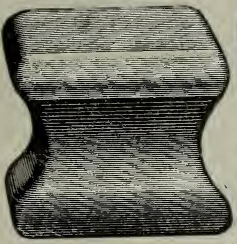
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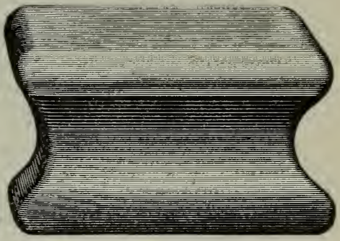
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2. Their resilience will open the jaws, if partially closed, as soon as muscular relaxation takes place.
3. Being grooved, they cannot fall into the mouth or be pressed out of place by the tongue.
4. They are too large to pass back into the pharynx or be swallowed, and they cannot be broken or injured by biting.
5. They do not need to have a string attached to them, and are readily removed with a crooked finger.
6. Each block can be set at two heights, and can be placed at any point between the jaws without likelihood of slipping.

Price . . . . each 35 cents.

TEST-PAPERS FOR DENTISTS.

It is always important to the dentist to know whether his peroxide of hydrogen, which is so liable to change, is still good or has become decomposed ; or whether his solution of bichloride of mercury has become inert by the reducing action of organic matter in the water under the influence of sunlight. And so of many other chemicals used in the dental office which are apt to change in strength.

To enable him to learn quickly and accurately whether his preparations are good or worthless, and without the use of cumbersome methods, Professor Charles Mayr has prepared a series of test-papers, which are put up in neat little books, each containing eight different papers (of some, like litmus, several papers are provided), affording sixty-four different reactions. The papers are as follows :

Phenyl-Carbinol, for strong acids and alkalies.
Turmeric, for alkalies.
Sulphide, for solutions of metals.
Potassium Iodide, for H_2O_2, bichloride $\frac{1}{500}$
Iodide Starch, for hydrogen peroxide.
Litmus, for weak acids and alkalies.
Erythroine, for salts and alkalies.
Lacmoid, substitute for litmus, not affected by carbonic acid.

Each paper has printed upon it the reactions it gives, so that even the inexperienced have a safe guide as to its uses.

Price . . . . per book 25 cents.

Forceps.

SPECIAL ANNOUNCEMENT.

We have decided to discontinue, for the present, the manufacture of what have been known as Plain-Line SSW Extracting Forceps.

The Reason Why.

In few words, because we cannot manufacture Forceps fast enough to supply the demand. In more than five years our shelves have not been graced by a full stock of Forceps. At no time within that period have we been able to fill offhand an order for a complete set in the two grades, "Plain Line" and "Best Quality."

Our Forceps Catalogue shows 107 forms. Some of these are made in several sizes, viz.: No. 1 Long Slender, Large, Medium, and Small; No. 2 Large, Medium, and Small, etc. There are also many Rights and Lefts, and some made with Straight and Hook Handles, so that a single grade represents 131 pairs. This multiplied by two equals 262, the number of forms of Extracting Forceps we have been struggling to keep in stock. This we find is too much for us.

Reminiscent and Retrospective.

A word concerning our Forceps and their relations to the dental and medical professions.

For many years after the establishment of our instrument factory we continued to buy Forceps, our name, or rather the name of "S. S. White," being stamped, by agreement, on one side of the joint, and that of the maker on the other. An annoying percentage of defective Forceps thrown back on our hands having forced the conclusion that that perplexing experience could be largely obviated by making the Forceps in our own shop, thus placing their quality within our control, we began their manufacture.

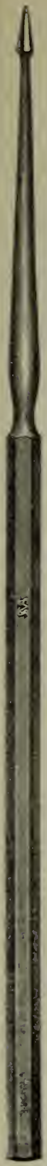
Wisdom with Experience.

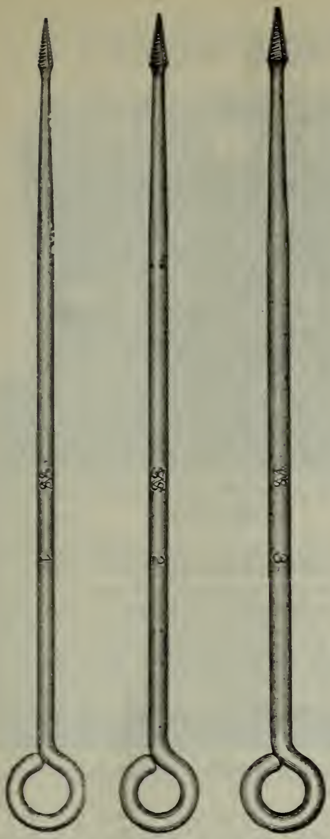
Experience soon demonstrated the wisdom of this move. We had very few complaints. In a little while—just so soon as their users had time to realize their actual value—words of praise greeted us. These were shortly followed by quite enthusiastic encomiums, and long before we had expected such gratifying expressions we were told repeatedly that our Forceps beat anything in the world in that line; and so it has been. Success has continuously crowned our efforts. The original shop outgrew itself; was removed to larger quarters; outgrew them, and was removed again, and still again. Each enlargement was supposed to be sufficient to enable us to meet any possible demand; but experience has proved that others appreciated our works more than we did our ability. Hence we find ourselves obliged to temporarily lessen the variety of forms in order to cope with the quantity demanded.

The Knot Cut.

We are therefore compelled, as the most feasible plan, to slice our task in half until we can satisfy the needs of the class of men who use our "Best" grade of Forceps. By so doing—concentrating our entire force on the "Best Quality" until such time as our product will warrant the restoration of the "Plain Line," should that ever again be deemed advisable,—we hope to be able to keep a full assortment of the one grade, and thus please a greater number of our patrons than has been possible during the attempt to keep up the entire double line.

"Best" is our aim, and "Best" it must be, wherever there is one possibility above another in grades of quality.





Morrison Reamer and Screw-Portes.

The Reamer is used to enlarge the openings into the canals of badly decayed roots to permit the entrance of the Screw-Porte for their extraction. Three sizes of the Screw-Portes are made, to suit differences in roots. The Reamer is made only on Octagon Handle.

Not kept in stock for Cone-Socket Handles.

The complete set is put up in a neat box with spaces let into a wood block to keep the instruments in place when not in use.

PRICES.

Per set, in box . . . $2.00
Reamer, Nickel-plated,
each 50 cts.
Screw-Portes, Nickel-plated . . each 50 "

Smith's Adamantine Phosphate Cement.

INSOLUBLE.

TWO COLORS.

Price - - - - **$1.00**

Also in Neat Cases, as shown in cut, containing four colors of Powder and one bottle of Liquid, glass-stoppered.

A, White; B, Brown; C, Yellow; D, Bluish.

Price - - - - **$2.00**

Smith's Oxychloride of Zinc.

PRICES.

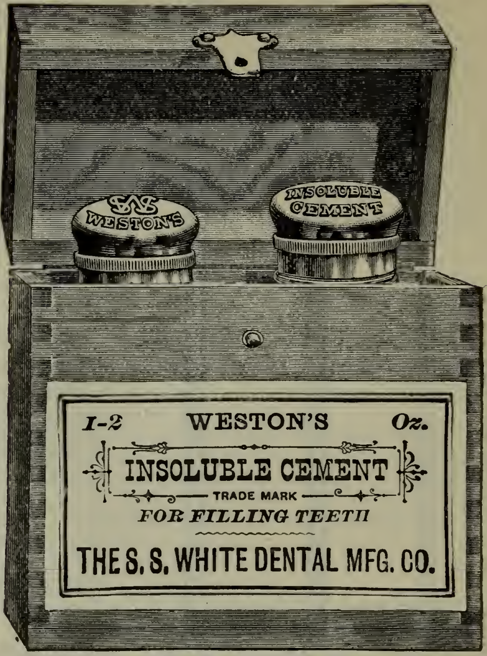
Plain Form, one ounce . . . . each $1.00
Neat Cases, as shown in cut, containing four colors of Powder and one bottle of Liquid, glass-stoppered . . . . . . " 2.00
A, White; B, Brown; C, Yellow; D, Bluish.

WESTON'S INSOLUBLE CEMENT.

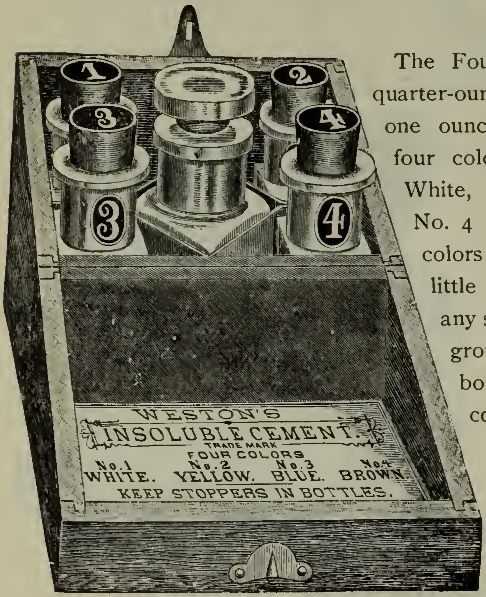
The value of Weston's Insoluble Cement is known everywhere. It is uniform in quality, mixes easily, hardens satisfactorily,—can be hardened in two minutes,—and lasts indefinitely. It is hydraulic to a high degree,—the best results being obtained when the filling is at once submerged in water as hot as the patient can bear and kept there from three to five minutes.

The One-Color Case contains a half-ounce bottle each of the powder and liquid.

Price, One-Color Case . . $1.50



One-Color Case. Actual Size.



Four-Color Case. Half-Size.

The Four-Color Case contains four quarter-ounce bottles of powder and one ounce-bottle of the fluid. The four colors are respectively No. 1 White, No. 2 Yellow, No. 3 Blue, No. 4 Brown. This assortment of colors enables the dentist with a little practice to match closely any shade of tooth desired. The ground-glass stopper of the fluid bottle is extended to form a convenient dropper.

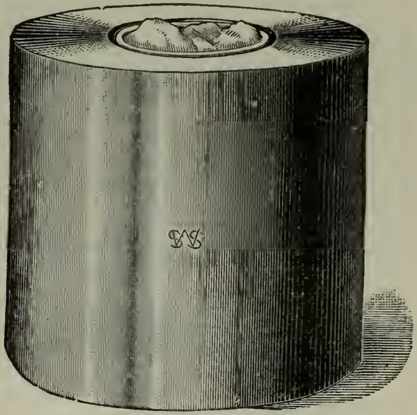
Price, Four-Color Case . . $2.25

Follow directions in mixing.

COTTON-HOLDER.

REDUCED PRICE.

Pattern furnished by Dr. E. METHOT.

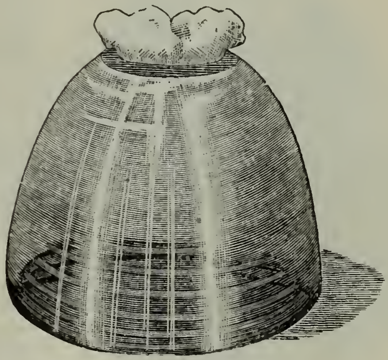


This compact, simple, and effective Cotton-Holder is made of brass, ⅛-inch thick, which gives the necessary weight without loading the base. The spring which forces up the cotton is soldered to two heavy brass disks, one of which forms the bottom of the Holder, and the other the plate on which the cotton rests. The cotton is firmly pressed against the orifice, thus being ready for use at any time.

Price, Nickel-plated . 70 cts.

GLASS COTTON-HOLDER.

Invented by Dr. E. J. THOMPSON.

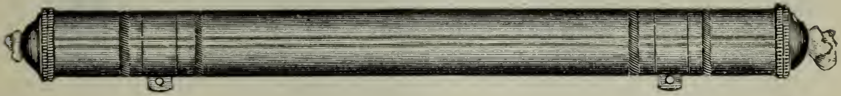


This simple, cheap, and effective Cotton-Holder is made of claret-colored glass, with an inner rim around the base, on which rests a conical spiral spring for pressing the cotton against the opening at the top. The Holder can be filled from the top without removing the spring.

Price . . . . each 35 cents.

Automatic Cotton-Holder.

Invented by Dr. A. C. RUNYAN.

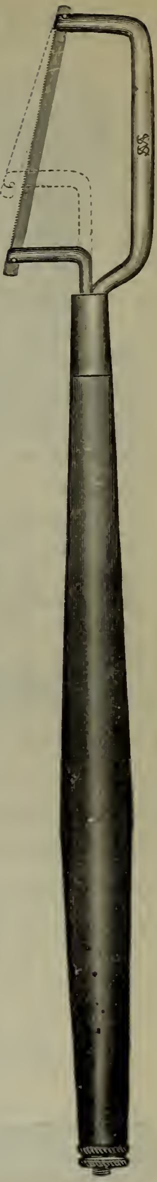


This Holder works on the same principle as the holder attached to our Holmes Table, and is similar to it except that the "Runyan" pattern is double-end while the "Holmes" is single. It can be screwed to the edge or base of a bracket-table, and one end may contain cotton while the other carries spunk or bibulous paper. Length, 12⅞ inches; diameter, 1 inch.

Price, Nickel-plated . . . . each $3.00

Adjustable Saw Frame.

Devised by Dr. Cecil P. Wilson.



The distinguishing features of this appliance are its easy adjustment, its firm hold, and, above all, its applicability to different lengths of saws or files. The longer arm is fixed in the handle, and the shorter is movable, its adjustment being controlled by the milled thumb-nut at the end of the handle. (The dotted lines show the range of movement.) The ends of the arms are split to receive the saws or files, which are securely fastened by a few turns of the thumb-nut, the studs being caught in little notches on the exterior surfaces of the arms. Altogether, it is the most complete Saw Frame before the profession.

The handle is of vulcanite, with a slight swell in the middle; all the metal parts nickel-plated.

PRICES.

Adjustable Saw Frame, with one Saw	each	$1.50
Saws, cut on one Edge . .	per doz.	.25
" " both Edges . .	"	.38
Files, Flat Face	"	1.25
" Oval "	"	1.50
Flexo Saws—two widths . .	"	.75

Rubber Aprons for Dentists.

Dentists, more especially those who do laboratory work, are frequently engaged in duties which make the possession of a conveniently assumed and quickly discarded protector of the clothing desirable. The leather apron of the blacksmith is hardly suitable, nor is the smock-frock of the butcher; but these Rubber Aprons are just what is wanted. Depending from the neck—34 inches long and 34 inches wide at the center—they cover the entire portion of the clothing exposed to the soil of work, and, the neck-band being capable of almost instantaneous attachment or detachment at either side, they can be put on or taken off in a moment. They will also be found useful in extracting operations. Made of Rubber Cloth, and finished in excellent style, with the edges bound.

Price	each 75 cents.

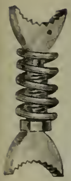
BRACKET TABLE COVERS.

We have a line of well-made, neatly fitting Linen Covers for the various styles of Bracket Tables we make. Red trimmings.

PRICES.

For Plain Rosewood Table	$0.90
" Allan Table	1.10
" Holmes Table	1.20

HOLMES'S SPRING JACK-SCREWS.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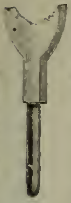
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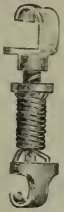
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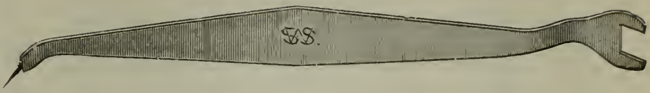


These devices of Dr. T. Stanton Holmes combine the screw and spring methods of moving teeth for regulating purposes. Fig. A shows the *pushing* action of the No. 1 style, which is to be operated by the nut-fitting end of the wrench; and Fig. B shows the *pulling* action of No. 3, the swiveled screw-head of which may be turned by the pointed end of the wrench. In both instances the turning of the screw causes a forceful spring action to the *extent only of the screw-thrust*, and so avoids the common danger of spring action, which, if neglected, may carry the tooth too far. No. 2 Jack is made by the substitution of a Long Head (No. 2) for the Short Head of No. 1.

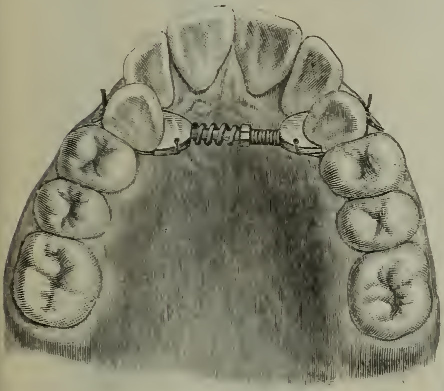


Fig. A.

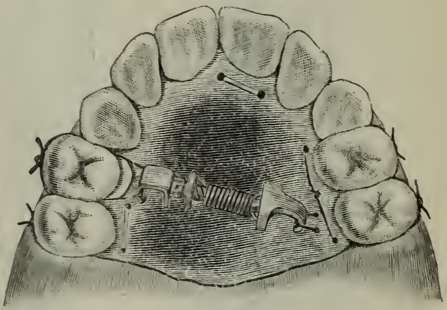
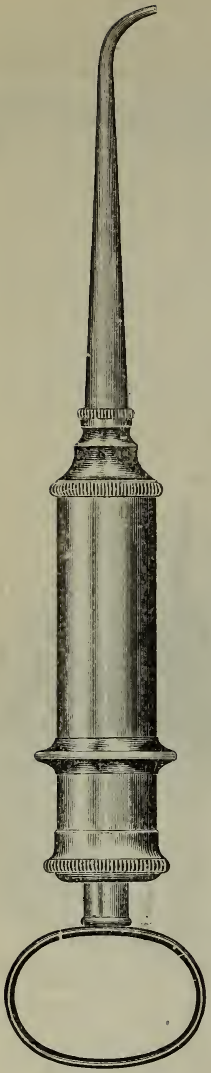


Fig. B.

PRICES.

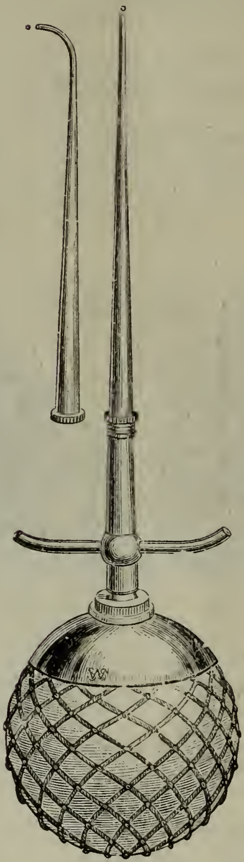
The Set, complete	$5.00
Pushing Spring Jack (Short or Long Head)	1.75
Extra Heads	each .50
Pulling Spring Jack, No. 3	2.50
Wrench	.25

SYRINGES.



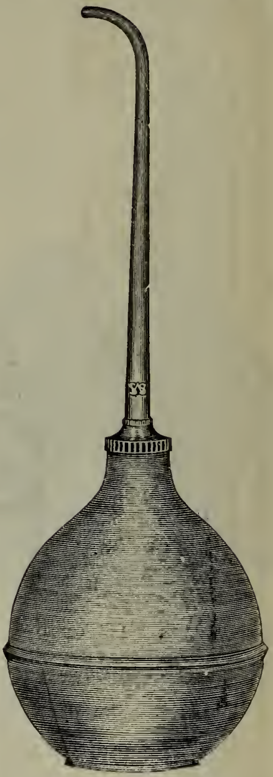
No. 4.

METAL SYRINGE.



No. 21.

DR. MOFFATT'S.



No. 22.

RUBBER BULB,

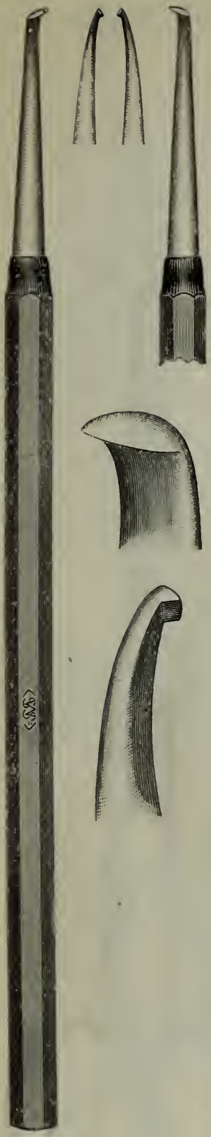
Nickel-plated

CHIP-SYRINGE.

PRICES.

No. 4.	Brass, Nickel-plated, one Curved Pipe, known as our "Metal Syringe," with Heavy Collar on Barrel as Finger-hold .	each	$1.00
No. 21.	Rubber Bulb Tooth, two Pipes (Dr. Geo. T. Moffatt's), Nickel-plated. Length, 5¼ inches	each	2.00
No. 22.	Rubber Bulb Chip, Nickel-plated. Length, 6 inches	"	.75

ENAMEL CLEAVERS.



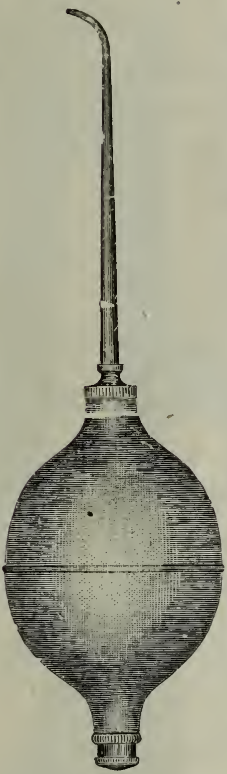
Patterns furnished by Dr. Calvin S. Case.

These instruments were devised by Dr. Case to overcome the difficulty he experienced with most of the appliances on sale in removing enamel whose integrity was practically unbroken. These are so shaped that they "can be partially rotated under the margin of the gum, presenting a sharp point toward portions of the enamel that will not easily cleave off, with a view to fracturing it as the diamond cuts glass, breaking it up into small particles which can be quickly detached and the sides straightened and smoothed by the broad blade."

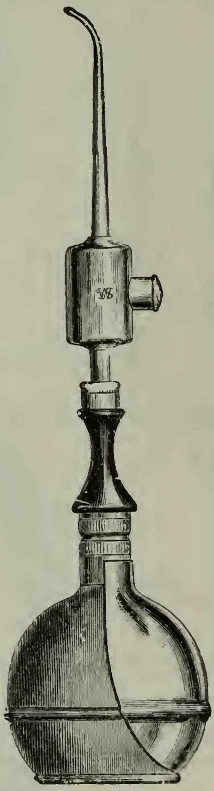
The peculiarities of shape are shown in the enlarged side cuts. The practicability of the instruments is readily seen. Tempered to take hold of the hardest enamel. Securely fixed on handles similar to our No. 10 Cone-Socket Handle. Right and Left.

Price . per pair $1.50, or each 75 cents.

SYRINGES.



Valved Rubber Bulb, Nickel-plated Chip Syringe.
No. 23.



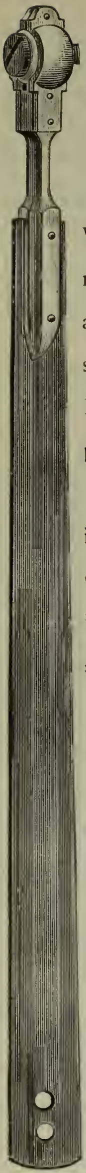
HOT-AIR SYRINGE, IMPROVED.
Patented November 25, 1875; July 26, 1892.
No. 25.

No. 23.	Rubber Bulb Chip, Valved, Nickel-plated. Length, 7¼ inches	each $0.85
No. 25.	Improved Hot-Air Syringe (S. S. White's), Nickel-plated, with Metal Guard. The Hot-Air Chamber is now filled with carbon, the best known heat-retainer. Full length of Syringe 9 inches	" 2.75
No. 26.	Same as No. 25, with Silk Netting on Bulb	" 3.25

Improved Pitman Springs

FOR

Old-Style S. S. White Engines and for Office and Laboratory Lathes.



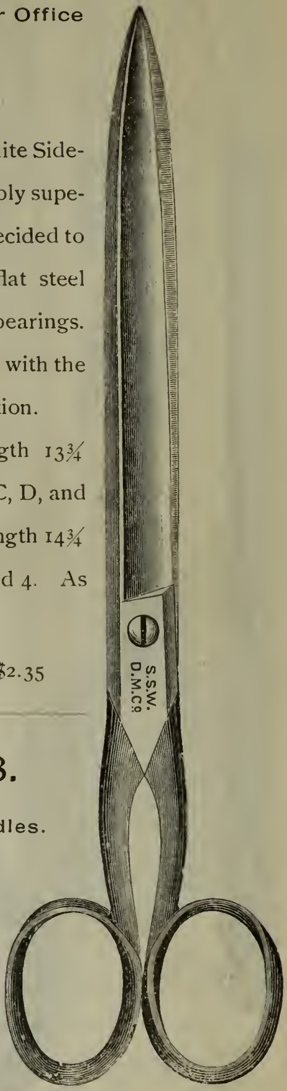
The Pitman Springs used in the S. S. White Side-Wheel Engines having proved immeasurably superior to those of the old-style engine, we decided to adapt it to the latter. It consists of a flat steel spring with brass connections and ball bearings. It holds the crank off center when at rest, with the pedal always in position for a forward motion.

Two sizes are made: No. 1 (full length 13¾ inches), for the S. S. White Engines A, B, C, D, and Office Lathes Nos. 1 and 2; No. 2 (full length 14¾ inches), for Laboratory Lathes Nos. 3 and 4. As sold they are ready to attach.

Price of either $2.35

Foil Scissors No. 8.

Japanned or Steel Bright Handles.



Cut about two-thirds size.

REDUCTION IN PRICE.

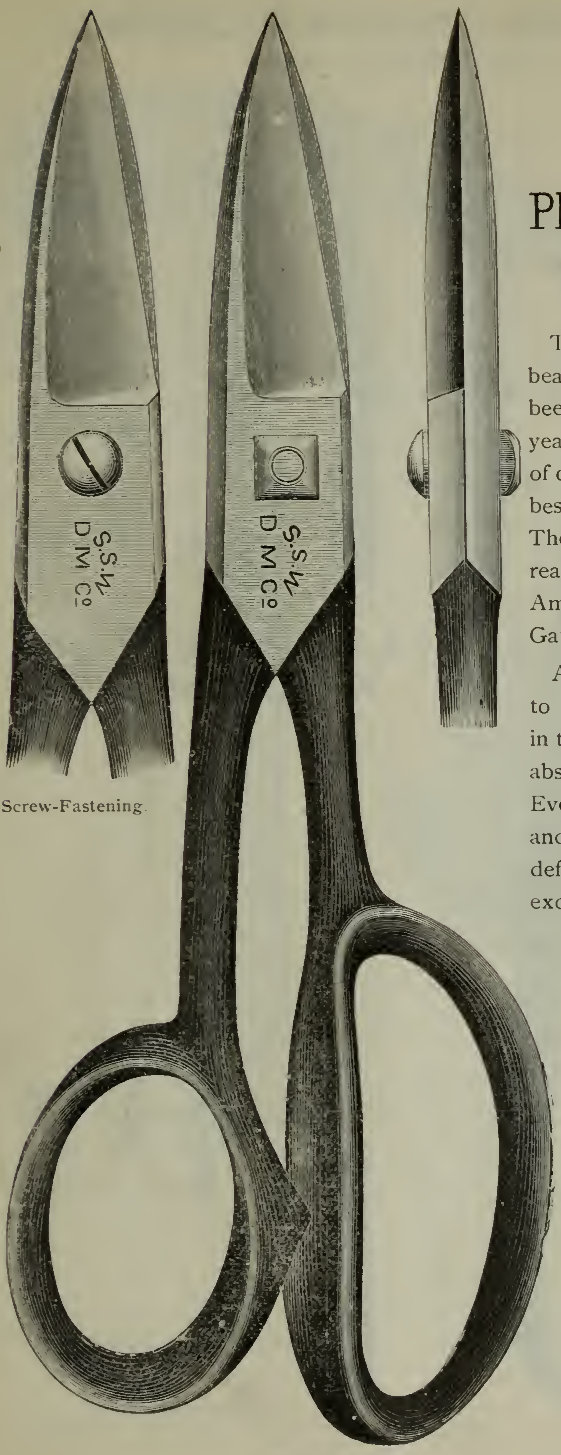
Made to our order abroad, stamped with our initials, and specially imported. A good, substantial, workaday article,—otherwise it would not go out under our name,—though not classed as equal to our own make.

Eight inches long over all. Made either Pointed or Blunt, with Japanned or Steel Bright Handles.

Price, either style, was $1.00; now 75 cents a pair.

Plate Shears.

PRICE REDUCED.



Screw-Fastening.

Nut-Fastening.

These Plate Shears, bearing our name, have been demonstrated by years of use in the hands of our workmen to be the best upon the market. They will cut metals readily up to No. 22 American Standard Gauge.

Although we are able to announce a reduction in the price, the quality is absolutely maintained. Every pair is warranted, and any showing flaws or defects will be cheerfully exchanged.

Two styles, Nut- and Screw-Fastening.

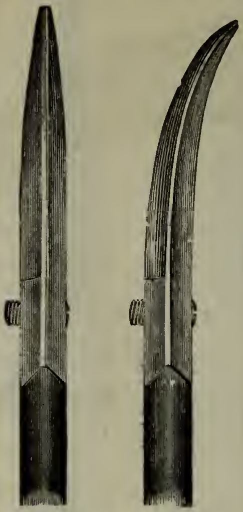
PRICES.

With Screw-Fastening, was $1.00; reduced to 75 cents a pair.

With Nut-Fastening, was $1.25; reduced to $1.00 a pair.

Plate Shears for Crown- and Bridge-Workers.

REDUCTION IN PRICE.



Designed especially to permit the delicacy and nicety of manipulation so frequently necessary in constructing crowns and bridges. To this end the blades are made short and strong, with small, neat points, and the handles light and relatively long so as to afford ample leverage. Cuts are full size.

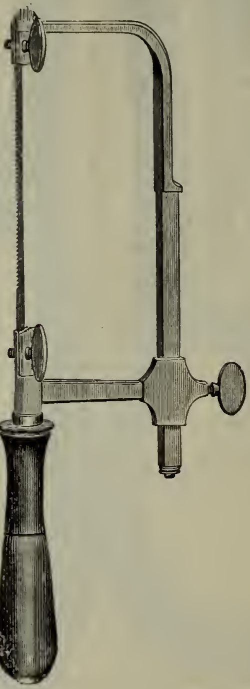
Made of solid steel, either straight or curved.

PRICE.

Straight .	per pair	$0.60
Curved .	"	.85

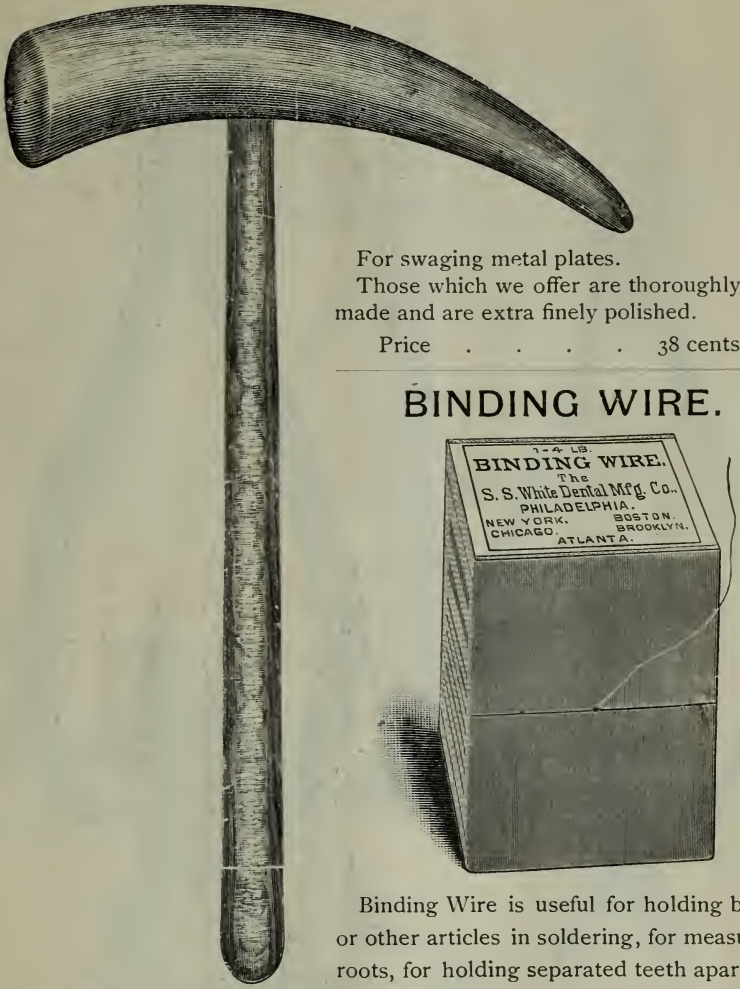
Mechanical Saw-Frame.

REDUCTION IN PRICE.



Price . . . . reduced to 60 cents.

Horn Swaging Mallet.



For swaging metal plates.

Those which we offer are thoroughly well made and are extra finely polished.

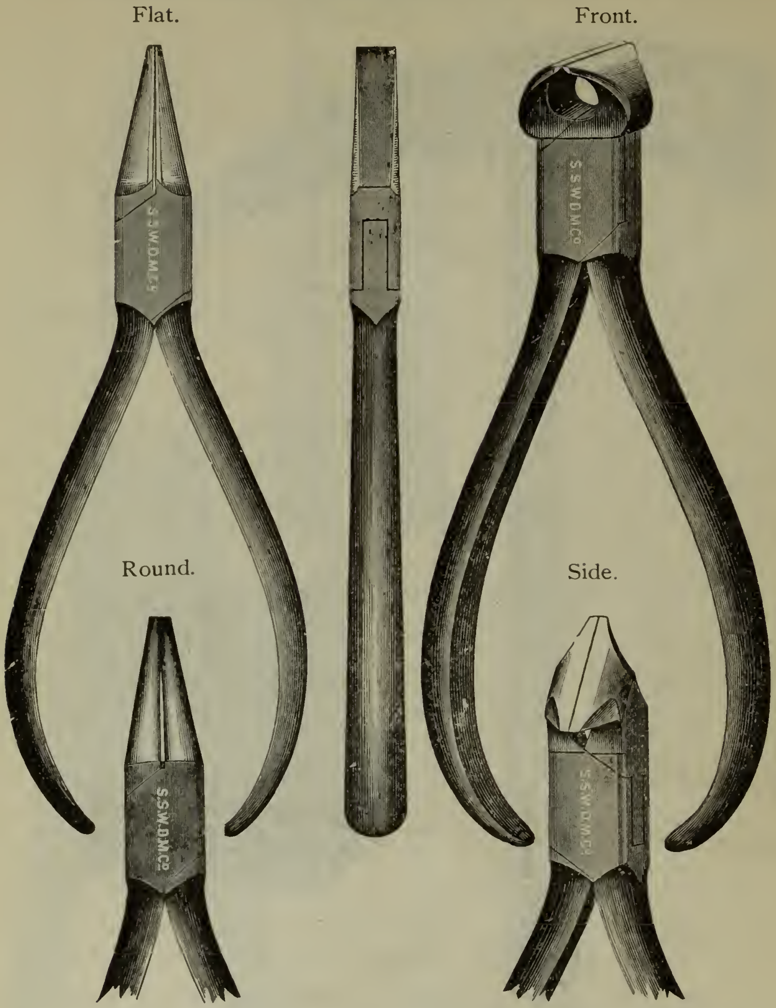
Price . . . . 38 cents.

BINDING WIRE.

Binding Wire is useful for holding bands or other articles in soldering, for measuring roots, for holding separated teeth apart, for supporting loose teeth, for strengthening investments, for crowding rubber-dam beyond cervical cavities, for—but every dentist knows its uses, and most of them know also that heretofore it could not always be had of the best quality or kept in the best condition. The stock we now offer is better quality than we were ever able to get before, and we put the spools up in a neat pasteboard box, properly labeled, with the end of the wire passed through the side. Keep the box in a convenient place, pull on the projecting end of the wire, and it comes out soft, smooth, without kink, snarl, or twist; cut off what is wanted, and the remainder is preserved in perfect condition, always ready for use.

Price, per Spool in Box . . . . 20 cents.

SOLID STEEL PLIERS AND NIPPERS.



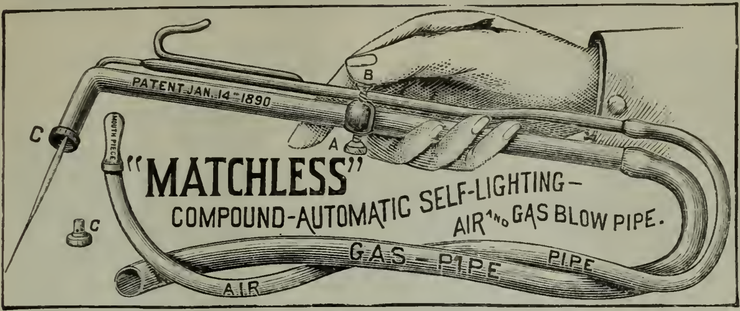
Two important points of this unequaled line of Pliers and Nippers : First, they are of steel throughout, the ordinary appliances of their class having iron handles with steel-faced points. Second, the finely proportioned and neatly and smoothly wrought-out handles afford firmness of grip with a comfortable "feel," the ends being rounded off so as to avoid cutting or bruising the hand when pressure is applied.

The Nippers, both front and side, are made in two sizes, 4 and 4½ inches ; the Pliers in three sizes, 4, 4½, and 5 inches.

PRICES.

Nippers, Front or Side,	4 or 4½ inches,	Plain .	per pair,	$0.80
" " "	4 or 4½	" Nickel-plated	"	1.00
Pliers, Flat or Round Nose,	4 or 4½ inches,	Plain	"	.50
" " " "	4 or 4½	" Nickel-plated	"	.65
" " " "	5 inches,	Plain . .	"	.55
" " " "	5 "	Nickel-plated .	"	.70

"MATCHLESS" BLOW-PIPE.



The inventor claims for the "Matchless" Blow-pipe that it is "the most powerful form made, and gives the most perfect flame yet produced." One of its principal merits is the combination of the automatic spring-valve B, and a movable adjusting-nut A. The flow of the gas is thus under perfect control. By pressing the spring-valve with the thumb, the pressure can be varied at will, and in case of a long operation, when the pressure is adjusted properly, a turn or two of the adjusting-nut fixes it at that point. The advantage in the saving of gas is apparent. A small screw-nozzle is provided for cases requiring a fine needle-point flame.

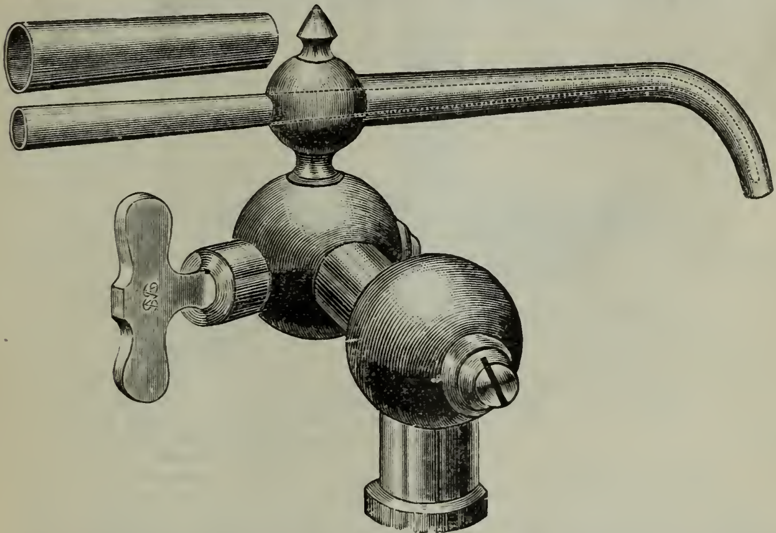
The "Matchless" Blow-pipe can be used with power, or when this is not at hand, as a mouth blow-pipe, for which purpose three feet of air-pipe are supplied without extra charge.

Price $2.50

THE S. S. WHITE DENTAL MFG. CO.,

Sole Agent for the Dental Trade and Dental Uses.

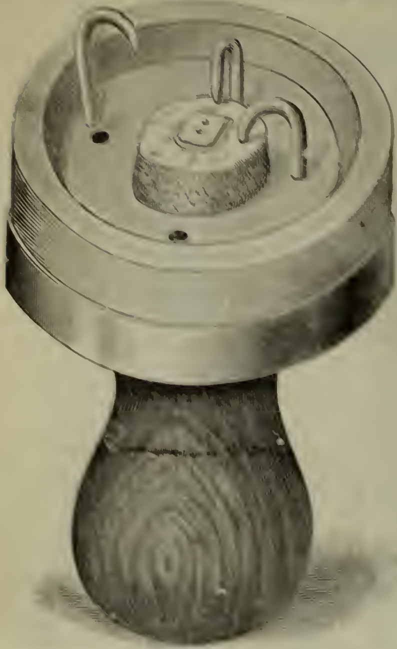
The Macomber Gas Blow-Pipe.



This well-known Blow-pipe can be attached to an ordinary gas bracket in place of the burner. The tube is double, or rather one tube inclosed in another, the air being driven through the inside tube, adding force and giving a cylindrical form to the flame.

Price $2.50

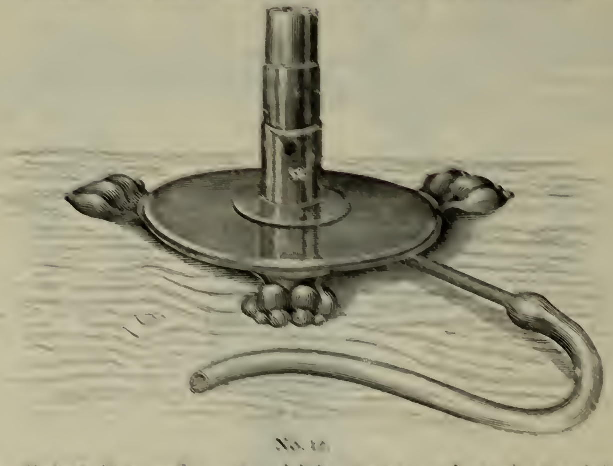
The Handy Soldering Tray and Investing Material.



This appliance consists of a circular asbestos soldering block or tray, with raised rim, set in a brass box mounted on a wood handle. Four holes are drilled through the bottom of the asbestos for the reception of brass pins to hold the work in place. The end of the wood handle is flat, so that the appliance can be held in the hand or set upon the work-bench. With the Tray and included in the price we supply a box of investing material made of a prepared asbestos fiber, which has the advantage over plaster of Paris, that the flame can be thrown upon it at once upon the completion of the investment without risk of cracking it, saving the time necessary to dry out plaster. This investing material is simply dampened—so much of it as is to be used—until the fibers cohere, forming a plastic lump, into which the work is pressed as shown in the illustration.

Price, Handy Soldering
Tray, including box of
Investing Material . 60 cents

LABORATORY GAS-BURNER.



No. 16.

A very efficient Burner for general laboratory work, and especially useful for heating Whitney and Hayes vulcanizers. When these vulcanizers are ordered for gas this Lamp is invariably sent, unless No. 13 is specified.

The tubes are made of brass and the base of malleable iron, japanned.

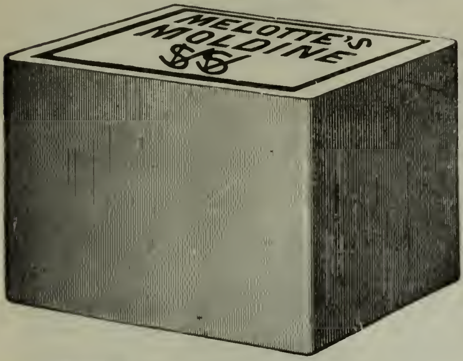
This Burner has been recently improved, and as now constructed it insures perfect combustion and affords excellent heating power.

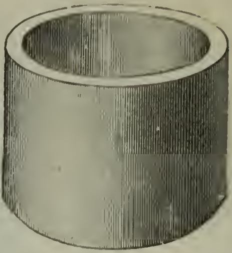
Price . . . . 50 cents.

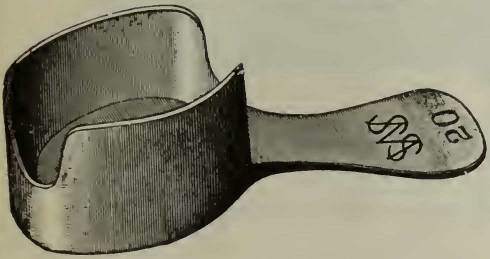
DR. MELOTTE'S

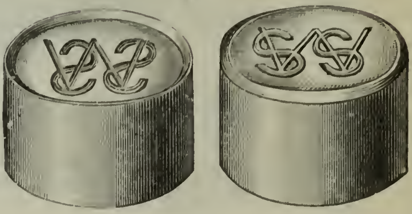
Moldine, Impression Cup, Ring, and Fusible Metal.

FOR CROWN DIES AND COUNTER-DIES.









By means of Moldine and its adjuncts an impression of one or two teeth or roots may be taken and a die and counter-die made in less than five minutes. Gold caps or regulating fixtures may be accurately fitted by means of the dies thus quickly formed. Dr. Melotte and other dentists have found these devices to simplify and expedite crown- and bridge-work. Moldine is also an immediate investient for work to be soldered; solder will not flow over the inside of a collar filled with Moldine, or over the inside of its cap. Metal work may be thus made or repaired without waiting a moment for the Moldine investient to dry or set. If Moldine stiffens by use, knead in a little glycerin.

Printed instructions accompany each package.

In ordering Moldine to be sent by mail please add the postage (20 cents for the complete apparatus; 10 cents for the material alone) to the remittance.

PRICES.

Complete Outfit, inclosed in a tin box containing one-half pound Moldine, one Cup, one Ring, and two ingots of Fusible Metal		$1.50
Melotte's Moldine	per half-pound	.50
Impression Cup (S. S. W. No. 20)	each	.25
Rubber Ring	"	.05
Fusible Metal, per ingot (about 2½ ounces) . .	"	.38

DR. PARR'S FLUX,

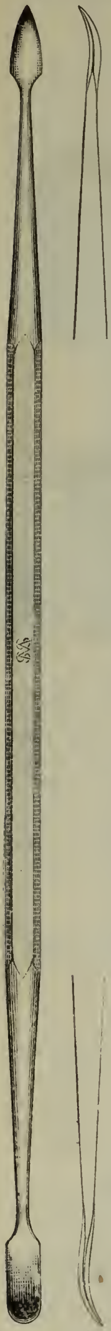
For Gold, Silver, Crown- and Bridge-Work.

This Flux is vitrified and pulverized ready for use. It is carefully prepared and free from slag, sand, and other impurities.

Put up in boxes, *directions on each.*

Price . . . . per box $1.00

WAX CARVING SPATULA.



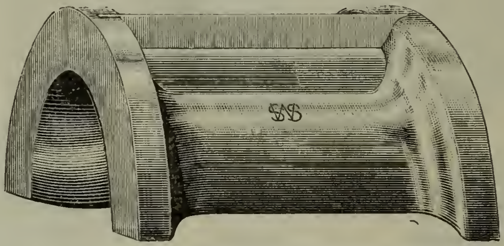
Devised by Dr. W. H. DORRANCE.

Understanding thoroughly the end aimed at, Dr. Dorrance has worked out in this neat double-end Spatula an effective instrument for carving forms of wax for plate-work and other purposes. It has been adopted by the Dental College of the University of Michigan. Nickel-plated all over.

Price . . . . 50 cents.

WAX KNIFE CLEANER.

Suggested by Dr. B. F. COSBEY.



Melted wax will accumulate on the knife, but it is readily removed with this Cleaner, which consists of a half-cylinder of lead, with a thin steel blade cast in its crown. The ends or heads of the lead block can also be used advantageously as a soft anvil in riveting metal backs on teeth for plate-work, etc., the curve of the edge making it very convenient for such use.

Price . . . . 50 cents.

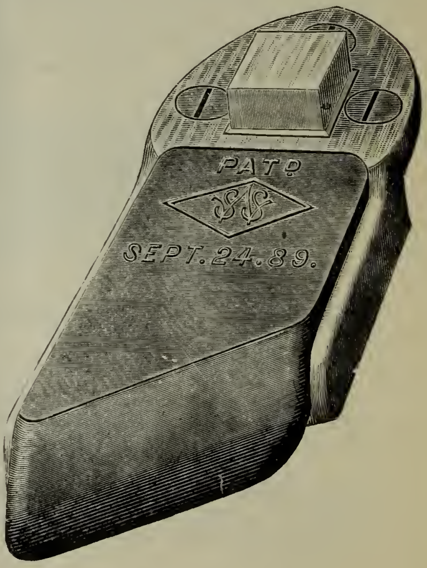
BENCH BLOCK.

Patented September 24, 1889, by Dr. E. R. MAGNUS.

As a file-block, soft rubber has no superior, if indeed it has a rival. This device places all the advantages of soft rubber at the easy disposal of the dentist. The frame is made of cast iron (gray nickel finish) surmounted by a chilled face anvil. It carries a thick block of par-vulcanized rubber, which for the purposes of a filing-block is claimed by the inventor to be greatly superior to any other material. The frame can be fastened to the laboratory or office bench by the three screws which accompany it.

The rubber Blocks can be replaced when worn.

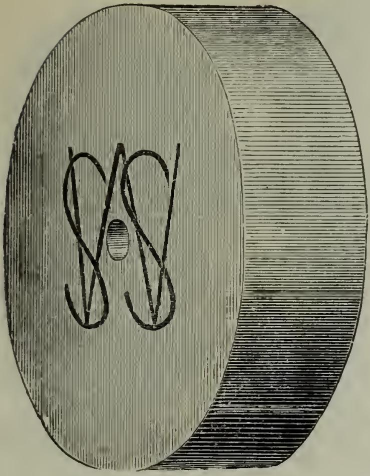
There are two sizes, designated as large and small. The large size is 5 inches long over all by 2¼ inches wide. The small size is 4⅜ inches long by 1⅝ inches wide.

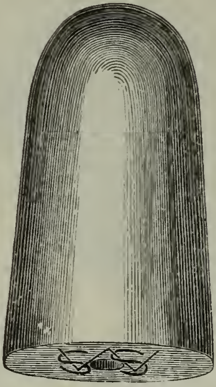


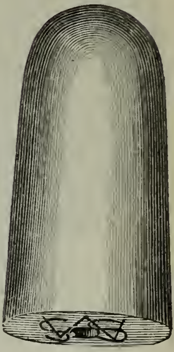
Price, either size	each	$1.25
Rubber Blocks, separately	"	.35

REDUCTION IN PRICE.

POLISHING WHEELS AND CONES.


Cut represents No. 4 Wheel.


Large Cone.


Small Cone.

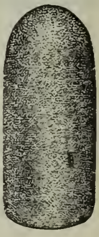
Felt Polishing Wheels and Cones.

PRICES.

Square-Edge Wheel No. 1, 1⅛ inches diameter . .	each	$0.15
" " " 2, 1⅝ " " . .	"	.15
" " " 3, 2¼ " " . .	"	.25
" " " 4, 2½ " " . .	"	.25
Knife-Edge " " 1, 1½ " " . .	"	.15
" " " 2, 1¾ " " . .	"	.15
" " " 3, 2¼ " " . .	"	.25
" " " 4, 2½ " " . .	"	.25
Small Felt Cone, ¾ inch diameter, 1½ inches long .	"	.10
Large " 1 " " 1¾ " .	"	.20

Very Small Felt Cone.

Suggested by Dr. H. A. Robinson.



This Cone is designed to reach difficult spaces when polishing plates. Its shape is satisfactory for general use. When for a particular case it is wanted a little narrower or more pointed, it can easily be trimmed to the desired shape.

Price	per doz.	$0.75
"	each	.07

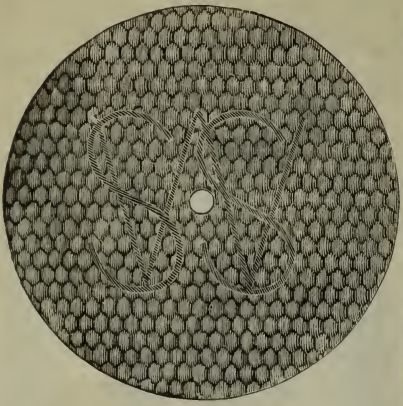
REDUCED PRICE.

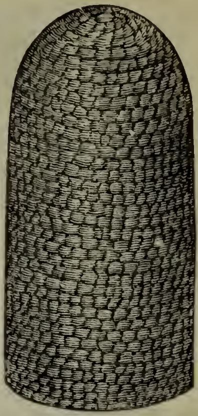
WOOD HANDLES FOR FILES.

Plain Wood Handles, ferruled, for small files. Were 6 to 10 cents each ; now 5 cents.

COTTON-DUCK BUFF WHEELS AND CONES.

Suggested by Dr. J. H. MEASE.





The Wheels are made in four sizes, varying from 1⅛ inches to 2½ inches in diameter. Cut shows No. 3. The large Cone is shown actual size.

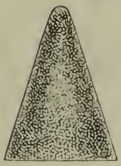
PRICES.

Wheels, No. 1, 1⅛ in. diameter	each	$0.10
" " 2, 1⅝ " "	"	.20
" " 3, 2¼ " "	"	.30
" " 4, 2½ " "	"	.40
Large Cones, 2 inches long, 1 inch diameter	"	
Small " 1⅜ " " 1 " "	"	.20
Extra Small Cones, 1$\frac{3}{16}$ in. long, ⅝ in. diameter	"	.10

Wood Cones for Finishing Vulcanite Plates.

Suggested by DR. N. C. BORNEMAN.

1



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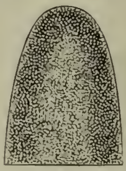


3

These Cones are made of soft wood coated with corundum, coarse and fine grits. They are intended to screw on the taper end of a lathe spindle or on a taper chuck. The illustrations are full size.

Put up in boxes of 1 dozen Cones, assorted.

Price . . . . per doz. 25 cents.

The Micro-Organisms of the Human Mouth.

The Local and General Diseases which are Caused by Them.

By WILLOUGHBY D. MILLER, D.D.S., M.D.,

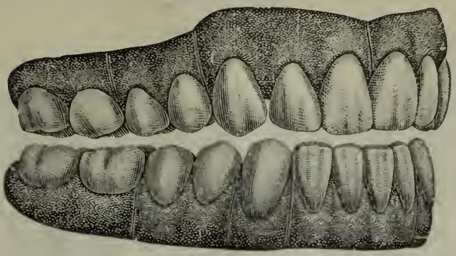
Professor at the University of Berlin.

With 128 engravings on wood, one chromo-lithographic and two photo-micrographic plates.

The book contains nearly 400 pages, octavo, handsomely printed on fine paper, with full Bibliography and Indices. Price, by mail, cloth, $5.00. Sent carriage free to any address on receipt of price.

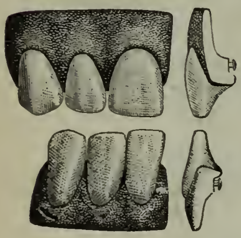
THE S. S. WHITE DENTAL MFG. CO., Publisher.

Gum Sections and Single Gum Teeth.

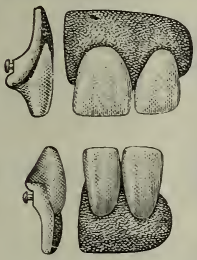


THE S. S. WHITE DENTAL MFG. CO.

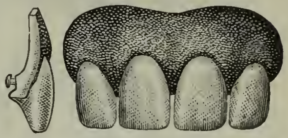
**Sectional 14's.
Upper and Lower.**



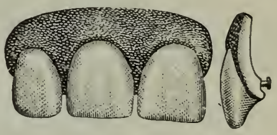
**Partials, Incisors.
Upper and Lower.**



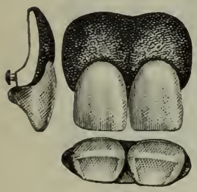
Sectional 4's, Incisors.



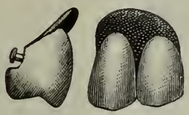
**Sectional 3's, Two Centrals
and One Lateral.**



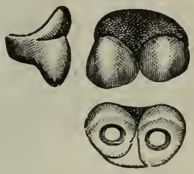
**Sectional 2's.
Centrals.**



**Partials, Bicuspids.
Upper.**

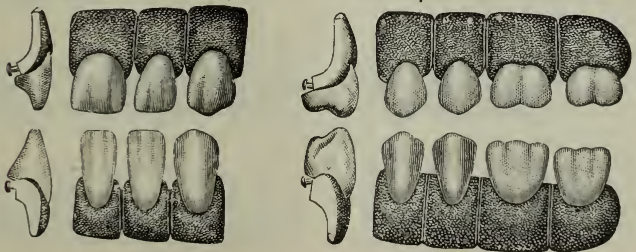


Perforated.



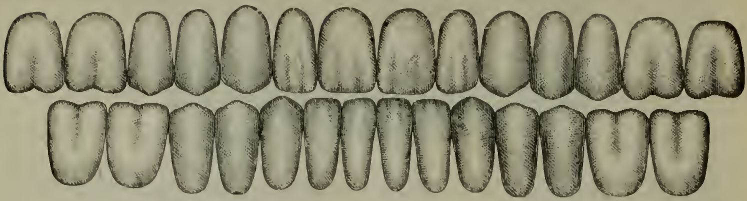
Single Gum Rubber, Upper and Lower.

Incisors and Cuspid. **Bicuspids and Molars.**



PLAIN TEETH FOR PLATE- AND BRIDGE-WORK.

A few samples of plain teeth, with wide neck, suitable for bridge-work.



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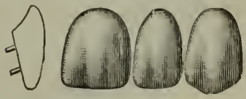

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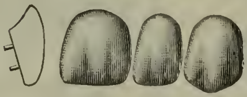

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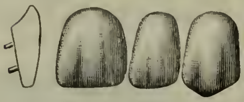

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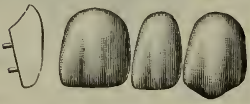

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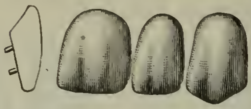

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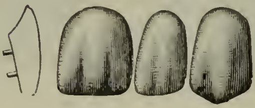

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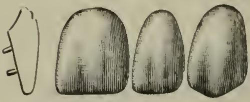

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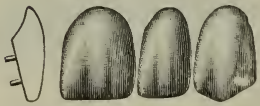

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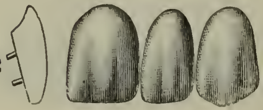

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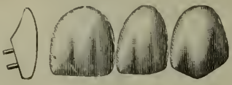

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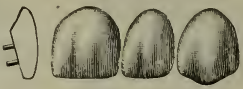

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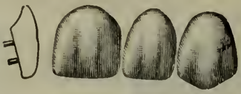

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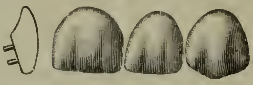

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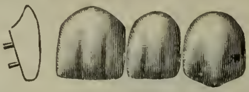

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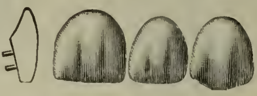

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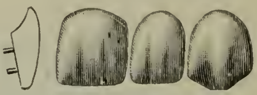

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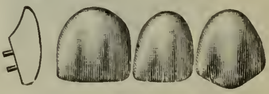

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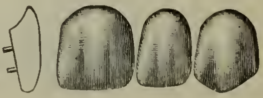
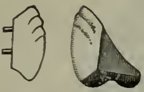


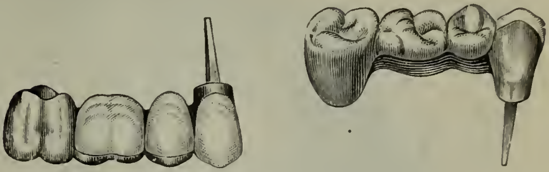
VENEERS, OR FACINGS, FOR BRIDGE-WORK.

Upper and Lower, Bicuspids and Molars.

68



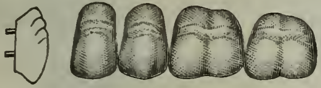
No. 68. Complete with solid gold cusp and backing.



Completed Bridge.

This line of veneers affords a wide range in the selection of facings for bridge-work. The later forms, Nos. 68, 69, 70, 71, 72, uppers, and Nos. 18, 19, 20, 21, lowers, are so shaped as to require but little grinding, and the thickness through the body of the tooth lessens the amount of gold needed for the backing.

68



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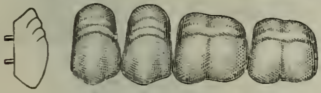

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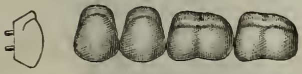

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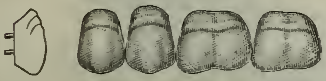

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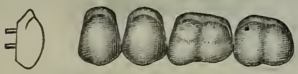

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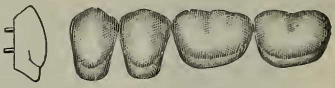

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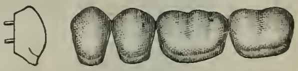

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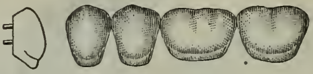

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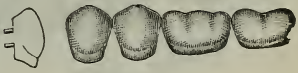

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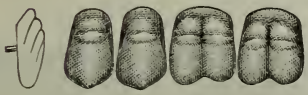

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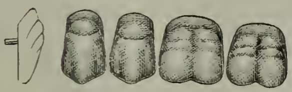

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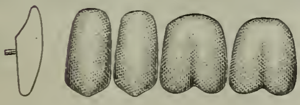

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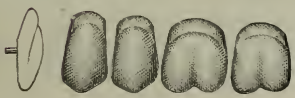
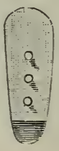
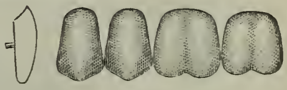




Back of a Bicuspid, No. 59.

54



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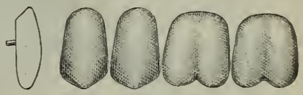

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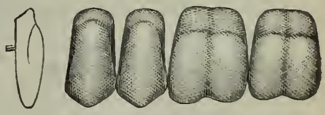

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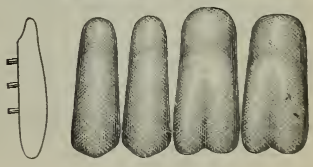
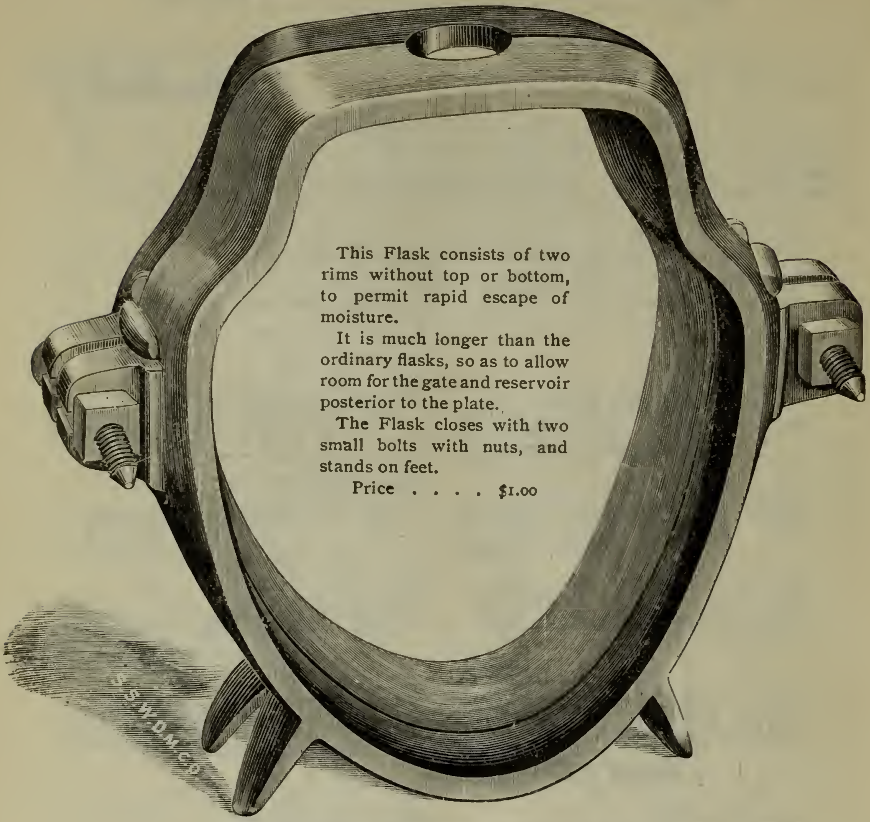


Weston's Improved Flask.



This Flask consists of two rims without top or bottom, to permit rapid escape of moisture.

It is much longer than the ordinary flasks, so as to allow room for the gate and reservoir posterior to the plate.

The Flask closes with two small bolts with nuts, and stands on feet.

Price $1.00

THE BEST LOWER DENTURE.

WESTON'S NEW METAL.

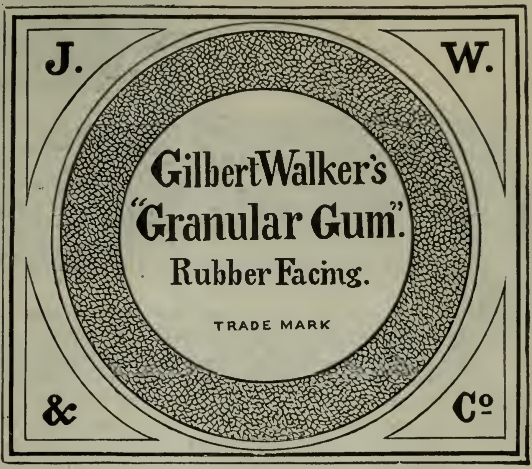
This alloy is superior to any other material used as a base for lower dentures, because of its absolute freedom from liability to warp or spring; because of its cleanliness—the joints are so tight that teeth broken from the plate after years of actual wear do not show a trace of deposit between them and the alloy backing; and because of its perfect adaptation and its weight. It is entirely tasteless and harmless in the mouth, contains no poisonous metals, such as antimony, lead, zinc, or copper, and plates made of it can be duplicated or repaired at a trifling cost.

Send stamp for small sample plate and instructions. Put up in ⅛-lb. ingots.

Price, Metal	per ingot	$1.00
" Solder	per oz.	1.00

Dr. Gilbert Walker's Vulcanizable "Granular Gum" Facing.

Patented January 1, 1889.



A decided improvement upon the solid color of pink rubbers for facings. When vulcanized, polished, and wetted (as by the saliva), it approximates the appearance of the well-known continuous-gum work, and the dentist can either match the natural gum adjoining the artificial gum of the partial denture, or suit the color of a full denture to the complexion of the patient.

"Granular Gum" vulcanizes with any dental rubber, and a very thin facing is sufficient. Wrapped in tin foil and put up in envelopes containing one ounce, which will serve for four full sets. Directions with each package.

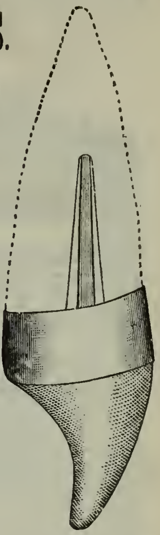
PRICES.

No. 1.	Mottled Granular Gum	per ounce $1.00
No. 2.	Purple Tint Dark Granular Gum . .	per ounce $1.15
No. 2A.	" " Light " " . .	
No. 3.	Florid " Dark " " . .	
No. 3A.	" " Light " " . .	

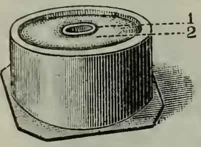
FUSIBLE METAL DIES FOR HOLDING BANDS.

REDUCTION IN PRICE.

Devised by Dr. E. L. TOWNSEND.



Dr. Townsend's device is primarily intended to supply an easy means of banding the Logan crown, thus increasing the strength of this admittedly strongest crown made. In using this device it is not necessary to leave the operating-room, and a half-hour is ample time to fit the band and adjust the porcelain to it. The inventor claims that it will save in gold the cost of the appliance on the first tooth set, and the trouble and dirt incident to investing and soldering; and that it will make the crown so strong that there is almost no risk of breakage.



Full directions sent with each Die.

Price . . . . each $0.75

GILBERT'S IMPERIAL VARNISH.

For Varnishing Plaster Impressions and for General Laboratory Use.

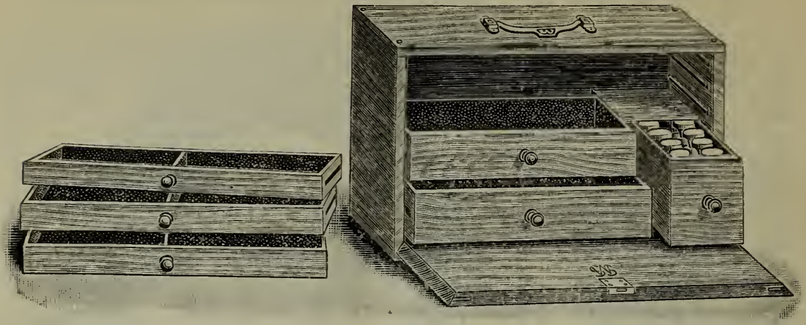
This well-known preparation is popular because of its intrinsic merits. No oil, soap, or coloring material is needed when Imperial Varnish is used.

Price . . . . per bottle 25 cents.

ASBESTOS.

Ground	reduced to 15 cents a pound.
Fiber	advanced to 30 " "

New Students' Case, "E."



This handsome new case for students differs radically from its predecessors, in that its interior is occupied by drawers instead of slides. The top is fixed, one side hinging from the bottom. When opened, the various drawers can be pulled out, each without disturbing the others. The three upper drawers, which are divided at the center, are 11⅜ x 7¾ x ⅝ inches inside measurements. Below these, at one end, is a medicine drawer, 2⅝ x 7¾ x 2¾ inches inside, containing spaces for ten square half-ounce vials and a box of cement. The medicine drawer is inclosed in a tight compartment, entirely separating it from the others. Alongside of it are two drawers, the upper 8 x 7¾ x $1\frac{3}{16}$ inches deep; the lower 8 x 7¾ x 1½ inches. These are not divided.

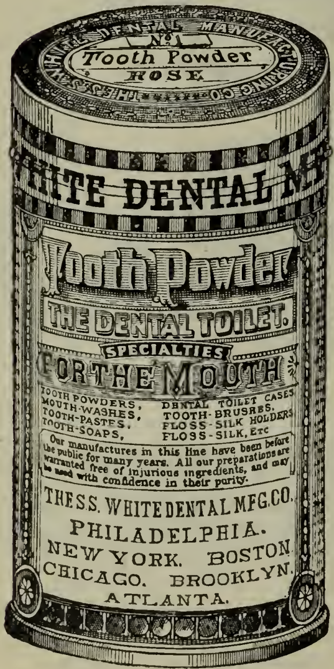
The outside dimensions of the case are 13 x 10 x 7¾ inches. Made of polished walnut, and lined with cotton velvet. The top is supplied with an ornamental handle. Lock and key.

Price $16.00

This price does not include the vials, which are ground-glass stoppered, at $1.00 a dozen.

No. 1 TOOTH-POWDER.

Two Flavors—Rose and Wintergreen.



This Powder has been known to the dental profession and to the public more than a third of a century. It has had an immense sale, and has received general and hearty indorsement. It is intended to meet all the requirements of a dentifrice for general use, combining elegance with efficiency, and it may be used with pleasure and benefit at all ages. It is highly perfumed with delicate oils, and is in every respect as perfect as we know how to make it.

Please state the flavor desired. When flavor is not mentioned we send Rose.

Put up in Handsome Enameled Metal Cans and Flasks. The quarter-pound, half-pound, and pound Cans are round, the four-pound square with rounded corners. The Flasks are oval, with screw-top, and hold two ounces.

PRICES.

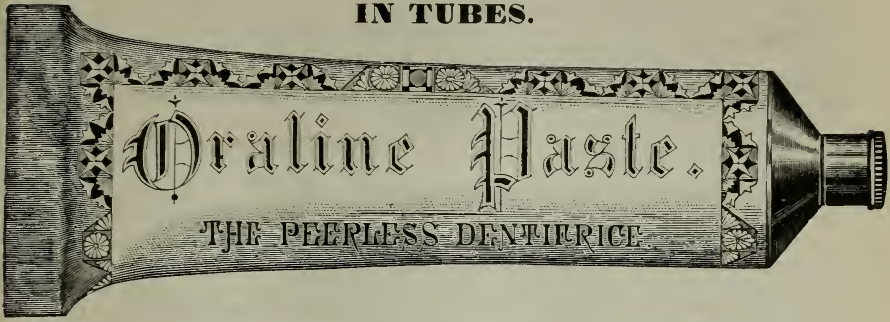
4-lb.	Enameled	Cans	each	$5.00
1-lb.	"	"	"	1.50
½-lb.	"	"	"	.90
¼-lb.	"	"	"	.50

A discount of 15 per cent. will be made to dentists on 5-lb. lots; 25 per cent. on 10-lb. lots, and 30 per cent. on 50-lb. lots.

ORALINE PASTE.

Oraline Paste combines real efficiency as an abrasive, detergent, and antacid with elegance as a toilet article. It imparts a delightful and persistent fragrance to the breath and a sense of cleanliness to the mouth. In these respects it is superior to any other article we have tested.

IN TUBES.


Oraline Paste.
THE PEERLESS DENTIFRICE.

Put up in tubes as shown in the cut, making it convenient for use; each tube inclosed in a neat box.

Price	per ½ gross	$20.40	Price	per dozen	$4.00
"	per ¼ gross	10.80	"	each	.40

IN OPAL GLASS JARS.

THE S.S. WHITE DENTAL MFG. CO.
ORALINE PASTE
PHILADELPHIA.
NEW YORK.
BOSTON. CHICAGO. BROOKLYN. ATLANTA.

For home use opal glass jars are perhaps preferable to the tubes above referred to. The jars, which hold 3¼ ounces, have a screw cap with nickeled rim, and a handsome lithographed label in gold and colors.

Price	per ½ gross	$25.50	Price	per dozen	$5.00
"	per ¼ gross	13.50	"	each	.50

SECOND-HAND CHAIRS, ENGINES, ETC., FOR SALE.

AT THE PHILADELPHIA DEPOT.

1	No. 4 Archer Chair, with Footstool and Spittoon (white marble top)	$45.00
1	Cycloid Chair, Maroon Plush, with Spittoon Bracket	50.00
1	Cycloid Chair, Maroon Plush, with Spittoon Bracket and Spittoon	72.00
1	Burritt Chair, Maroon Plush, with Spittoon	33.00
1	Dental Chair, Ball and Socket, covered with Hair Cloth	20.00
1	S. S. W. Jap. Bracket, with plain Allan Table, fair condition	15.00
1	Morrison Student Chair, in perfect order	75.00
1	Pedal-Lever Chair, Maroon Plush	95.00
1	Wilkerson Chair (Old Style), Maroon Plush	90.00
1	Old Style S. S. W. Engine, with H. & W. Hand-piece	20.00
1	Seabury Vulcanizer, O. S.	15.00
1	Yoke Attachment, complete, with 100-Gallon Cylinder, 7-Gallon Gas-Bag, and No. 2 Inhaler	20.00

AT THE BOSTON DEPOT.

1	Pedal-Lever Chair, latest style, Maroon Plush, with Combination Attachment, good as new	$150.00
1	Pedal-Lever Chair, Maroon Plush, with Spittoon, and in good order	100.00
1	Archer No. 0 Chair, Dark Brown Corduroy, Footstool and Spittoon, for only	20.00
1	Archer No. 2 Chair, Closed Arms, in Maroon Plush, with Footstool and Spittoon, good order	30.00
1	Archer No. 7 Chair, Red Leather, used but two weeks, good as new	32.00
1	S. S. W. "B" Engine, No. 8 Hand-piece, good as new	35.00
1	Tees Furnace, never used	15 00

AT THE CHICAGO DEPOT.

1	Old Style S. S. White Pedal-Lever Chair, Maroon Plush	$90.00
1	Cycloid Chair, Maroon Plush	45.00
1	Archer Iron Chair, Green Plush	20.00
1	Adjustable Fountain Spittoon	40.00
1	Cord Engine, No. 7 H. P., nearly new	35.00
2	S. S. White Engines, Old Style . . . each	10.00

AT THE ATLANTA DEPOT.

1	Style "A" Wilkerson Chair, newly upholstered in best Maroon Plush, bright parts re-nickeled, and all in first-class order, with Combination Attachment, less Table and Spittoon; Style "A" is the original Wilkerson Chair and has Child's Seat	$140.00
1	Morrison Chair, in perfect order. Newly upholstered in Maroon Plush, bright parts re-nickeled. Chair is as good as new	95.00
1	Johnston Engine, in good order, with R. A. Attachment; has a good No. 6 Hand-piece	28.00
3	Boston 2-flask Vulcanizers, for Gas or Kerosene. Never used. Brass Flasks . each	13.00
1	"Niagara" Lathe Head and Stand complete, in good condition	8.00
1	S. and L. Gasometer, with Inhaler No. 3, and Covered Tubing. Complete, with 100 gallons of Gas. In good order	20.00
1	"American System of Dentistry," complete; 3 vols., Sheep, in perfect condition	15.00
1	"Pepper's System of Medicine," 5 vols., Sheep, good as new	20.00
1	Johnston Engine, No. 6 Hand-piece	15.00
1	S. S. White Engine, "A," No. 7 Hand-piece	15.00

The prices named do NOT include charges for Boxing, when necessary.

METHODS OF FILLING TEETH.

BY

RODRIGUES OTTOLENGUI, M.D.S.

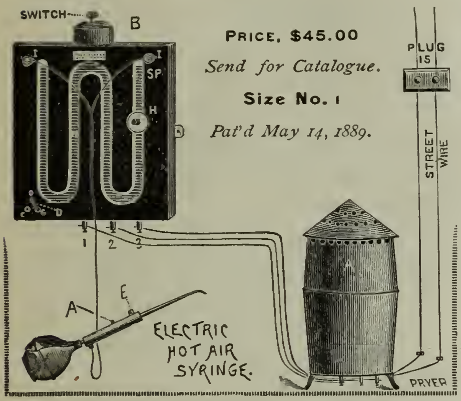
WITH

236 Illustrations.

The keynote to this book is its practicality. As the author says in his preface, "There is not a case described that has not occurred in my practice. There is not a method advocated that I have not tested."

The book is therefore *not* a cyclopedia of generalizations upon different methods of attaining the result, but a plain, simple, amply illustrated description of methods which are known to be successful.

Price . . . . by mail, post free $2.50



PRICE, $45.00

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JOHN L. GISH, M. D., D. D. S.

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DENTAL CAPSICUM PLASTERS, well known and used throughout the world. $1.00 per box.

HARD BUFF POLISHERS, for the Engine. Great for polishing fillings and discolored enamel. 40 cents per 100.

PAPER POINTS, for drying pulp-canals. Speak for themselves. Very practical. 25 cents per 100.

HARD BUFFS FOR THE LABORATORY. Three large sizes. Very stiff. Best polisher ever used on crown- and bridge-work. Price per doz., 25 cents.

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MANUFACTURERS OF

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Nos. 228 and 230 Pear Street, Philadelphia.

The attention of Dentists is invited to our FINE GOLD FOIL, which is prepared under our constant personal supervision. Our Nos. are 4, 5, 6, and 8.

We are also manufacturing COHESIVE FINE GOLD FOIL, Nos. 4, 5, and 6.

ALL our Gold Foil is manufactured from ABSOLUTELY PURE GOLD, prepared expressly for the purpose, with great care, by ourselves.

ADDRESS **CHARLES ABBEY & SONS, Philadelphia.**

PERSONAL.

G. Lenox Curtis, M.D., D.D.S., formerly of Syracuse, N. Y., has opened an office at No. 124 West 34th street, New York City, where he will devote himself exclusively to the practice of Oral Surgery. Dr. Curtis is connected with the New York Post-Graduate Medical School, where he holds clinics twice a week.

Dr. Curtis does no dental work whatever.

FOR SALE, AT A SACRIFICE,

the complete dental apparatus of the late Dr. John E. Register, of Dover, Del. His office is for rent, with addresses of patients. This is a splendid opportunity for a dentist. Apply to J. Alexander Fulton, Dover, Del., or

I. LAYTON REGISTER, *Adm'r*,
Drexel Building, Philadelphia.

FOR SALE,

a $4500 practice in a live Western town of 10,000. Only two other dentists, neither graduate. Price $1500; $500 cash, balance to suit purchaser. Address

"C. K. C.,"
Care DENTAL COSMOS.

A SPLENDID OPPORTUNITY.

The finest dental practice in South America for sale. Climate unexcelled. Full particulars by inquiry of

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World's Columbian Exposition.—Notice to Dentists.

The undersigned, owning property in close proximity to the main entrance to the Exposition, will erect a building and make other suitable arrangements to accommodate members of the dental profession who intend to visit the great Exposition. It is hoped that this may be extended so as to make a headquarters for the profession. The probability is that the facilities in the immediate vicinity will be taxed to the utmost, and that prices will be materially higher than if accommodations are secured in advance. Those wishing further information will, upon sending address, be furnished with a circular giving full details.

C. STODDARD SMITH,
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Indiana Dental College,

INDIANAPOLIS, IND.

Fourteenth Annual Session will begin the first Tuesday in September, 1892, and end the last Friday in March, 1893.

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W. G. FOSTER, D.D.S., Demonstrator of Mechanical Dentistry.

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The Baltimore College of Dental Surgery, the first, and for many years the only dental school, offers facilities for the study of dentistry proper such as age and experience only can give. Its immense museum, complete apparatus, large and well-arranged building, and carefully studied curriculum, give to its students great advantages and opportunities, both theoretical and practical, while its age gives its diploma a dignity far out-ranking all other colleges—a diploma honorably represented in all civilized countries, and held by the most distinguished members of the dental profession.

The fact that dentistry must be practically taught is fully recognized, the College Infirmary, a most complete, large, and handsome hall, being daily filled with clean and respectable patients, of a class nearly equal to those of the average dentist. The Infirmary is open all the year, students paying an entrance fee, which is deducted from those of the regular succeeding course.

The session begins October 1, closing in March. A large corps of demonstrators, always present, put in actual practice the teachings of all lecturers in dentistry—leaving nothing undemonstrated. All methods are fully taught, all appliances and apparatus used; the making of instruments and the most elaborate gold and continuous-gum work, and all the cases arising in ordinary practice, with many which are rarely seen, carefully demonstrated.

The College has formed an alliance with the College of Physicians and Surgeons by which its students are privileged to attend all lectures and clinics. The patients of this medical school numbered last year over 40,000.

Graduates of the Baltimore College of Dental Surgery are required to attend but one session at the College of Physicians and Surgeons prior to presenting themselves as candidates for the degree of M.D. (See Catalogue.) In accordance with the resolutions adopted by the National Association of Dental Faculties, which go into effect for the session of 1891 and 1892, the qualifications for entering the first year's course are a preliminary examination in the ordinary English branches.

TERMS OF GRADUATION.—Attendance on three winter courses of lectures in this College; as equivalent to one of these we accept one course in any reputable dental college. Graduates in Medicine can enter the Junior class.

BENEFICIARY STUDENTS.—Each State Dental Society is privileged to send one Beneficiary Student to this College at one-half the regular fees. This has been for some years an established feature of this College.

FEES—Matriculation (paid once only), \$5.00. Tuition fees, \$100.00. Diploma fee, \$30.00. Dissecting fee, \$10.00.

Students corresponding with the Dean will please be careful to give full address, and direct their letters to

Prof. R. B. WINDER, Dean,
No. 716 Park Avenue, Baltimore, Md.

PHILADELPHIA DENTAL COLLEGE
AND HOSPITAL OF ORAL SURGERY.
Cherry, above Seventeenth Street.

ANNOUNCEMENT.

The College Year begins with the Spring Session, March 1, which Session continues until the last day of May. The Winter Course commences October 1, and closes on the last day of February ensuing. A preliminary Fall Course opens September 1.

The Dispensary and Laboratory are open all the year, except during the summer vacation. Instruction in *Practical Dentistry* is a prominent feature of the institution. This work is under the supervision of an executive committee composed of the practicing dentists of the school, the members of which, aided by competent Demonstrators, give special attention to the interests of students. The Dispensary consists of large, well-lighted rooms, furnished with comfortable operating-chairs, tables, and all conveniences. As an excess of patients is in attendance at the clinics, the opportunities here presented for acquiring a knowledge of clinical dentistry are ample and complete. The new laboratory is the largest of its kind in the country.

A clinic in *Oral Surgery* is held every Saturday at 12 M.

Graduation.—Attendance on three courses of Lectures and satisfactory examinations in theory and practice are required for graduation. **Graduates in Medicine** are eligible for graduation in Dentistry after attendance on Lectures and Clinical Service during two courses. These are excused from examination on Anatomy, Chemistry, Physiology, and Surgery.

Fees.—Tickets for each course, including the Demonstrator's, $100; Matriculation, inclusive of Syllabi for home study, $5 for each course; Examination and Diploma Fee, $25. Board, $4 to $6 per week.

Special Clinics, for the study and treatment of Diseases of the Teeth, are held twice weekly by Professors Flagg and Stellwagen, and on Crown- and Bridge-work Wednesdays and Fridays, at 8 A.M., by Professor Guilford.

Lectures on Descriptive Anatomy, by Dr. Boenning, are given Monday and Thursday evenings, at 8 o'clock.

Examinations. First Year.—Progress in Anatomy, Physiology, Anesthetics, and Anesthesia. Second Year.—Progress in Chemistry, Prosthetic and Operative Dentistry, and final in Anatomy, Physiology, and Anesthetics and Anesthesia. Third Year.—Final in Chemistry and Materia Medica, Practical, Prosthetic, and Operative Dentistry, and Dental Pathology and Therapeutics.

Graduation in Medicine.—Graduates in Dentistry desiring to take the Medical degree continue their studies in the Medico-Chirurgical College.

PRACTICAL REQUIREMENTS.

First Year (Freshman).—General plate-work in laboratory, and the preparation and filling of at least twenty-four cavities in extracted teeth with Tin foil, Gutta-percha, Zinc phosphate, and Amalgam. The cavities when prepared are to be shown to the demonstrators for criticism or approval, as also the fillings when completed. The best six of the entire number are to be mounted and deposited in the College museum. Any student failing to do the above work satisfactorily, will have his admission to the Junior Class conditioned on completion of it before the middle of the Junior term.

Second Year (Junior).—General plate-work and the making of the prescribed depositing plate, also the preparation of roots and the making and mounting of six dowel crowns, three hollow metal crowns, and a piece of bridge-work, including two or more suspended crowns, on teeth out of the mouth.

Third Year (Senior).—Making of practical case and the requisite graduation fillings. In special cases, subject to the approval of the Professor of Practice, a case of crown- or bridge-work (in the mouth) may be accepted in lieu of the practical plate. Hours for examination of practical work and graduation fillings, Mondays, Tuesdays, and Saturdays, from 10.30 A.M. to 12 M.

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Demonstrator of Chemistry	S. P. GERHARD, M.D.

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The appointments of the Lecture-Rooms, Operating-Room, and Laboratories are the most complete in America.

The belief entertained when the Dental Department was started that the facilities for obtaining a supply of clinical patients were ample, has been fully realized, and owing to the unequaled accommodations and appointments of the new operating-room, the daily applications are now largely in excess.

Laboratory instruction of each student, not only in Practical Dentistry but also in Practical Chemistry and Histology, forms a prominent feature in the Department of Dentistry.

FEES.

Matriculation Fee (paid once only) .	$5.00	Dissecting Fee (Second year) . .	$10.00
Fee for One Course of Lectures . .	100.00	Graduation Fee (Third year) . .	30.00

Board can be obtained at from five to eight dollars per week, according to location and accommodations. In locations near the college, students generally pay about five dollars per week.

Students of the Dental Department have access without additional charge to all the other lectures and clinics in the Medical Department.

Surgical clinics at University Hospital twice a week; at Philadelphia Hospital, contiguous to the grounds of the University, Wednesday and Saturday.

University of Pennsylvania.—Dental Department.

The dental department possesses the means for thorough training, both theoretical and practical, not surpassed, it is believed, by any other institution. The operating-room is 151 feet in length by 46 feet in width, and lighted by windows on all sides. In front of each window is placed a Morrison Chair, a handsome nickel-plated movable bracket, and a neat walnut table. Battery wires are arranged to a number of the chairs for the use of electric pluggers.

The Mechanical Laboratory is supplied with all the modern appliances, and is under the care of an able and experienced mechanician. Special clinics will be given in continuous-gum and crown- and bridge-work.

The extensive Chemical Laboratories are under the charge of a demonstrator well qualified to meet all the requirements of his position.

The Dissecting-Room is large, well lighted, thoroughly ventilated, and is furnished with ample material for the successful prosecution of anatomical studies.

THE REGULAR OR WINTER SESSION.

The session will commence October 1, and ends at Commencement, early in May. The number of lectures per week, with a synopsis of the various branches taught, will be found in the General Catalogue.

In order to facilitate work in the practical departments, and to fully employ the student's time, the regular winter sessions are so arranged that the first-course student is required to devote the morning hours equally between *dental, histological, and chemical laboratory work.*

During the second and third years the student has the entire forenoon of each day for practical dental work. Ample opportunity is afforded for practice in operative and mechanical dentistry. In the latter branch, the students of the first year are divided into sections, thus devoting the time not otherwise engaged to practice in the operative and mechanical rooms.

It is believed that this plan of *grading the course*, and of affording the first-year student an opportunity of coming forward for examination in the branches of chemistry, histology, and materia medica, and the second-year student upon anatomy and physiology, will not only prove an economical arrangement of his time, but will really facilitate his labors in the acquirement of knowledge in the remaining branches.

PLAN OF EXAMINATIONS.

Attendance upon three regular winter courses of lectures will be required before the final examination for the degree of Doctor of Dental Surgery.

At the close of the first year, examinations are held in *chemistry, histology, and materia medica*, and the second year upon *anatomy* and *physiology*. If the student is not qualified, a second examination is afforded him at the beginning of the next winter session.

The final examination at the close of the third year is in *operative dentistry, mechanical dentistry, metallurgy, dental pathology and therapeutics.*

All applicants for advanced standing must pass the required examinations of this school, or furnish proof that they have passed *equivalent* examinations in some recognized dental or medical school. Graduates of a recognized medical college will be admitted to the second-year class without examination.

CONDITIONS OF ADMISSION.

Candidates for admission are required: *First*, to write an essay (not exceeding a page of foolscap) as a test of orthography and grammar. *Second*, to pass an examination in the English branches, viz: grammar, arithmetic, history, and geography.

A candidate who has received a collegiate degree or passed the matriculate examination of a recognized college, or who has a certificate from a normal, high, or grammar school, or a teacher's certificate properly attested, may enter without examination.

For information and announcements address

JAMES TRUMAN, D.D.S.,
Dean of the Dental Faculty, 3243 Chestnut Street,
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The Principal Demonstrators are assisted by *sixteen* Assistant Demonstrators. Special Instructions are given in Continuous-Gum and Bridge-Work.

At stated times during the Annual Sessions a number of prominent dental practitioners will hold Clinics and deliver Clinical Lectures.

Each year since its organization has added to the reputation and prosperity of this University Dental School, until now its graduates, in almost every part of the civilized world, are meeting with the success that ability will ever command. The past session was the most successful one in number of matriculates ever held; and visiting dentists from all parts of this country have expressed themselves as being astonished and gratified at the ability shown by the students when operating upon patients in the Infirmary. Forming one of the departments of *one of the oldest Universities* in this country, its diploma is everywhere recognized and honored.

The instruction in both operative and mechanical dentistry is as thorough as it is possible to make it, and embraces everything pertaining to dental art. The advantages which the general and oral surgical clinics, to which the dental students are admitted, as indeed to all the lectures of the University, afford, cannot be overestimated. The many thousands of patients annually treated in the University Hospital, well known to be the largest Hospital in Baltimore, afford an abundance of material for dental infirmary and laboratory practice, and the oral surgery clinics.

The Infirmary and Laboratory practice for students is exceptionally large, a fact that adds so greatly to the facilities of this Dental School.

The Dental Infirmary and Laboratory Building is one of the largest and most complete structures of the kind in the world. The Infirmary is lighted by forty-seven large windows, and is furnished with the most improved operating chairs. It has again become necessary to enlarge the Dental Building, making an Infirmary nearly one hundred feet long, and a Laboratory eighty feet long and forty-three feet wide.

The Dental Infirmary and Laboratory are open daily (except Sundays) during the entire year for the reception of patients; and *the practice for dental students* has increased to such an extent that all the students during the past session have had an abundance of practical work in both operative and prosthetic dentistry. This means for practical instruction has already assumed such large proportions that the supply has been beyond the needs of the large classes in attendance during the past sessions. The exceedingly large number of patients for the extraction of teeth affords ample facilities for practical experience to every student.

In addition to the facilities afforded by this institution for a thorough course of instruction in the theory and practice of dentistry, the clinics in the University Hospital enable the Dental equally with the Medical Students to become familiar with the diseases and operations of Practical Surgery. Excisions of jaw, partial or entire; tumors, cancerous or benign, of various parts of the buccal cavity; plastic operations for restoration of cheek, lips, etc., may be mentioned as having been before the class during the year. The induction of anesthesia by means of different agents—ether, chloroform, bromide of ethyl, nitrous oxide gas, all being used in the clinics—cannot fail to be of use to the student of Oral Surgery. Junior as well as Senior students are afforded every opportunity for practical instruction in both operative and mechanical dentistry.

The Lecture Halls in the University Buildings are large and well lighted; and every facility will be afforded for practical and theoretical dental instruction. Demonstrations in Anatomy, Physiology, and Pathology (for which an abundance of material is furnished free of charge), also form an important part of the regular course. The Dissecting Room is large, well ventilated and lighted, and the Demonstrator of Practical Anatomy passes much of his time in assisting the students and directing their labors. Dissecting Material is furnished in abundance, free of charge.

The Qualifications for Admission and Graduation are those adopted by the National Association of Dental Faculties and the State Dental Examining Boards. The Diplomas of this School are recognized by all State Dental Examining Boards.

Qualifications for Graduation: The candidate must have attended three full courses of lectures of five months each in different years at the Regular or Winter Sessions in this institution. The following, however, will be considered as an equivalent to an attendance on one course of lectures in this College: One course in any reputable Dental College; graduation in a reputable Medical College with one year of dental pupilage in a dental infirmary. The student meeting either of the above requirements will have the privilege of presenting himself as a candidate for graduation at the end of but one Course of Lectures. The matriculant must have a good English education; a diploma from a reputable literary institution, or other evidence of literary qualification will be received instead of a preliminary examination. All students, both juniors and seniors, have equal advantages in operative and mechanical dentistry in this institution throughout every session.

Graduation in Medicine: Graduates of the Dental Department of the University of Maryland are required to attend but one session at the University School of Medicine prior to presenting themselves as candidates for the degree of "Doctor of Medicine." (See Catalogue.)

The **Regular or Winter Session** will begin on the 1st day of October, and will terminate in March of each year.

The **Summer Session**, for practical instruction, will commence in March, and continue until the regular Session begins. Students in attendance on the Summer Session will have the advantages of all the daily Surgical and Medical Clinics of the University.

The fees for the Regular Session are $100, Demonstrators' Fees included; Matriculation Fee, $5; Diploma Fee, for candidates for graduation, $30; Dissecting Ticket, $10.

For Summer Session, no charge to those who attend the following Winter Session.

Beneficiary.—A Beneficiary student will be received from each State, on the recommendation of the State Dental Society, on the payment of half of the tuition fees. Board can be obtained at from $3.50 to $5 per week, according to quality.

The University Prize and a number of other Prizes will be specified in the annual Catalogue.

Students desiring information and the annual Catalogue will be careful to give full address and direct their letters to

F. J. S. GORGAS, M.D., D.D.S.,

Dean of the Dental Department of the University of Maryland,

845 N. Eutaw Street, Baltimore, Md.

UNIVERSITY OF MICHIGAN.

COLLEGE OF DENTAL SURGERY.

The eighteenth annual session begins October 3, 1892, and closes June 29, 1893.

The preliminary examination will be held Wednesday, September 28, 1892.

Three full courses of study of nine months each are required for graduation.

The fees, which must be paid in advance each year, are, for non-residents of Michigan, $60 first year; $35 second year; $45 third year. These fees cover all expenses of tuition, but not of material consumed by students in laboratory courses.

The annual announcement, containing full particulars, will be sent to anyone addressing a request to

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Harvard University, Dental Department

BOSTON, MASS., 1892-93.

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HENRY L. UPHAM, D.M.D., Instructor in Operative Dentistry.
ARTHUR H. STODDARD, D.M.D., Instructor in Mechanical Dentistry.
ELLIS P. HOLMES, D.M.D., Instructor in Operative Dentistry.
HENRY A. KELLEY, D.M.D., Instructor in Operative Dentistry.
PATRICK W. MORIARTY, D.M.D., Demonstrator of Mechanical Dentistry.
JAMES R. WHITE, D.M.D., Instructor in Mechanical Dentistry.
SIDNEY R. BARTLETT, D.M.D., Instructor in Mechanical Dentistry.
HARRY O. BIXBY, D.M.D., Instructor in Mechanical Dentistry.
BENJAMIN H. CODMAN, D.M.D., Instructor in Operative Dentistry.
ARTHUR W. ELDRED, D.M.D., Instructor in Mechanical Dentistry.
JOSEPH J. PAUL, D.M.D., Demonstrator of Operative Dentistry.
RICHARD C. MORITZ, D.M.D., Instructor in Mechanical Dentistry.

The Twenty-fifth Annual Session of this school begins Sept. 29, 1892, and ends June 28, 1893, with a recess of one week at Christmas, and another in April, making a school-year of nine months of practically continuous work.

General Anatomy, by Dr. Thomas Dwight; *Physiology*, by Dr. H. P. Bowditch; and *General Chemistry*, by Dr. Wm. B. Hills, together with ample dissecting under able demonstrators, are the studies of the first year, and are identical with those of the Harvard Medical School. The studies for the second year are Operative and Mechanical Dentistry, Materia Medica and Therapeutics, Oral Surgery, and Surgical Pathology. Of the third year the studies are Operative and Mechanical Dentistry and Orthodontia. Attention is called to the fact that *twenty-seven months* of progressive instruction compose the required three years in the school.

All applicants for advanced standing must pass the examinations of the years they desire to omit, or furnish proof that they have passed *equivalent* examinations.

At the end of each year written and oral examinations test the student's knowledge, and he must pass satisfactorily in a majority of the studies of each year before he can pass on to the next year's class.

To those wishing to take the medical degree the studies taken in the first year of this school are allowed in the Medical School of the University, after passing the required entrance examinations.

The University Degree, D.M.D. (*Dentariæ Medicinæ Doctor*), is conferred upon all who fulfill the requirements.

The diploma is accepted by the English Board of Registration under the new Dental Act, so that graduates of this school, *not British subjects*, can practice dentistry in Great Britain without further examination.

Graduates of recognized dental schools will be admitted to the courses of Operative and Mechanical Dentistry on payment of $50 each, or $100 for both, for the whole or any portion of the academic year.

FEES.

There are no fees for matriculation, nor for the diploma, nor for the demonstrators. For the first year a student is a member of the school the fee is $200, payable in two installments of $120 and $80; for the second year, $150, in two payments of $100 and $50; for any subsequent year, $50. For information and announcements address

THOMAS H. CHANDLER, Dean,

161 Newbury Street, Boston, Mass.

ESTABLISHED 1845.

Ohio College of Dental Surgery.

DEPARTMENT OF DENTISTRY—UNIVERSITY OF CINCINNATI.

SESSION 1892-93.

FACULTY.

J. S. CASSIDY, M.D., D.D.S., Professor of Chemistry and Materia Medica.
H. A. SMITH, D.D.S., DEAN OF THE FACULTY, Professor of Operative Dentistry and Dental Pathology.
C. M. WRIGHT, D.D.S., Professor of Physiology and General Pathology.
WM. KNIGHT, M.D., D.D.S., Professor of Anatomy and Oral Surgery.
GRANT MOLLYNEAUX, D.D.S., Professor of Mechanical Dentistry and Metallurgy.

C. I. KEELY, D.D.S.,
Lecturer on Irregularities of the Teeth.

L. E. CUSTER, D.D.S.,
Lecturer on Anæsthetics and Obtundents.

DEMONSTRATORS.

E. A. MEHAFFEY, D.D.S., J. E. BARRICKLOW, D.D.S.,
Demonstrators of Operative Dentistry.

G. C. MINTURN, D.D.S.,
Demonstrator of Mechanical Dentistry.

H. C. MATLACK, D.D.S.,
Demonstrator of Anatomy.

H. T. SMITH, D.D.S.,
Demonstrator of Analytical Chemistry.

The Forty-seventh annual session begins October 1, 1893

FEES.

Freshman Year.			
Matriculation	$5.00	Professors' Tickets	$75.00
Junior Year.		Senior Year.	
Professors' Tickets	$75.00	Professors' Tickets	$75.00
Dissecting Ticket	10.00	Graduation Fee	25.00
Analytical Chemistry	10.00		

For further information and Announcements, address
H. A. SMITH, D.D.S., Dean.
or H. T. SMITH, D.D.S., Secretary,
128 Garfield Place, CINCINNATI, O.

CHICAGO COLLEGE

—OF—

DENTAL SURGERY.

DENTAL DEPARTMENT OF LAKE FOREST UNIVERSITY.

PRACTITIONERS' COURSE.

The Fifth Regular Course for Practitioners will begin April 11, 1893, and continue until April 30. This course was instituted for Practitioners who feel the need of a more thorough understanding in all the latest and most approved methods pertaining to the practical part of Dentistry. Special attention will be given to such branches as Crown- and Bridge-Work, the Construction of Metal Plates, the manipulation of the various Materials in Filling Teeth, the best methods of making Inlays, methods of Regulating Teeth, the use of all the latest Medicaments in the treatment of diseased conditions, and the proper performance of operations in cases calling for surgical interference. The subject of Anesthesia will be treated experimentally and clinically, and the entire course conducted with a view to imparting that kind of practical knowledge which is most needed by the average practitioner. Practitioners attending the course will engage in practical work. Each member of the class who attends the full course will receive the practitioner's certificate.

The College has decided to give a series of courses of three weeks each to Practitioners, during the summer of 1893; and commencing with the regular course, which opens April 11, one course will follow another up to October 1.

These courses will be so arranged that Dentists wishing to visit the World's Fair can take a course at any time.

The hours for practical instruction and lectures are so arranged that the entire morning, from 8.30 to 12.30, will be spent under the personal instruction of the teachers, leaving the afternoons free for the Exposition, or they may be spent in the Laboratories or Infirmary.

There will be no course during the week of the Dental Congress.

FEES FOR PRACTITIONERS' COURSE.

Matriculation Fee	$5.00
Tickets for the Course	35.00

Board, including light and fuel, can be obtained at a convenient distance from the College, at from $4 to $6 a week.

THE SPRING TERM.

The Spring Term, which is especially designed for beginners, will open Monday, April 3, 1893.

THE WINTER COURSE.

The twelfth annual Winter Course will begin in October, 1893.

Letters of inquiry should be addressed to

Dr. TRUMAN W. BROPHY, Dean,
96 State Street, Chicago, Ill.

COLLEGE OF DENTISTRY.

Department of Medicine. University of Minnesota.

FACULTY.

Cyrus Northrop, LL.D., President.

W. Xavier Sudduth, A.M., M.D., D.D S., Professor of Embryology, Pathology, and Oral Surgery.

Thomas E. Weeks, D.D.S., Professor of Dental Anatomy and Operative Technics.

Charles M. Bailey, D.M.D., Professor of Prosthetic Dentistry, Orthodontia, and Metallurgy.

William P. Dickinson, D.D.S., Professor of Operative Dentistry and Dental Therapeutics.

Thomas G. Lee. A.M., M.D., Professor of Histology.

George A. Hendricks, M.S., M.D., Professor of Anatomy.

Richard O. Beard, M.D., Professor of Physiology.

C. J. Bell, A.B., Professor of Chemistry.

H. M. Bracken, M.D., L.R.C.S.E., Professor of Materia Medica.

Henry S. Nachtrieb, B.S., Lecturer on Comparative Dental Anatomy.

F. E. Twitchell, D.M.D., Instructor in Continuous-Gum Work.

Miland Austin Knapp, D.D.S., Instructor in Technics.

J. D. Jewett, D.D.S., Instructor in the Administration of Anesthetics.

Forrest Hay Orton, D.D.S., Instructor in Cleft-Palate Appliances.

—————— Demonstrator in Charge of the Prosthetic Laboratory.

ANNOUNCEMENT.

The fifth year of instruction will commence Tuesday morning, October 4, 1892, and continue eight months. There will be no lectures Thanksgiving day, Washington's Birthday, or Good Friday. The holiday vacation begins December 17 and closes January 4.

Examinations for promotion and degrees in the Dental Department begin May 18, 1893.

REQUIREMENTS FOR ADMISSION.

Applicants for admission to the College of Dentistry will be required to prove their fitness to enter the college:

1. By writing legibly and correctly an English composition of not less than two hundred words.
2. By evincing reasonable familiarity with Latin Grammar.
3. By passing an examination upon either the elements of Algebra, Plane Geometry, or Botany.
4. By passing an examination in Elementary Physics.

It is provided, however, that students, matriculates, or graduates of reputable colleges of Science, Literature, and Arts, or graduates of High Schools of the first grade, shall be exempt from the provisions of this examination. Applicants are given one year to make up a condition in the entrance examination.

PRELIMINARY COURSE.

(OPTIONAL.)

A preliminary course has been established for a class of students who find themselves unprepared to pass the examination required for entrance into the regular college course.

The *manual training* part of this course will be thorough, and will have a direct dental tendency. It will consist of a course of instruction in the manufacture of dental instruments and the regular course in Prosthetic Technics laid down for the Freshman class, together with Latin, Botany, and Physics, when the student stands in need of such instruction to prepare him to pass the regular entrance examination to the Freshman class. The last named studies will be taken in the *Minneapolis Academy*, a preparatory school for the University.

The requirements for admission to the *Preliminary course* are properly certified marks from some school or a written examination in arithmetic complete, English Grammar, and U. S. History to the close of the Revolutionary war.

FEES.

Matriculation fee, payable annually, $10.00. Lecture courses, annually, $45.00. Chemical Laboratory, $10.00. Material for dissection, $20.00. Histological laboratory course, $10.00. Graduation fee, $10.00. Senior Technical course, $10.00.

W. XAVIER SUDDUTH, Dean of the Dental Faculty,

Minneapolis, Minn.

COLLEGE OF DENTISTRY,

University of California.

SAN FRANCISCO, CALIFORNIA, U. S. A.

FACULTY.

MARTIN KELLOGG, A.M., President *pro tem.* of the University, and *ex-officio* President of the Faculty.
JOSEPH LECONTE, M.D., LL.D., Honorary Professor of Biology.
C. L. GODDARD, A.M., D.D.S., Professor of Orthodontia and Dental Metallurgy.
L. L. DUNBAR, D.D.S., Dean, and Professor of Operative Dentistry and Dental Histology.
MAURICE J. SULLIVAN, D.D.S., Professor of Dental Pathology and Therapeutics.
W. E. TAYLOR, M.D., Professor of the Principles and Practice of Surgery.
A. L. LENGFELD, M.D., Professor of Materia Medica and Chemistry.
WILLIAM B. LEWITT, M.D., Professor of Anatomy.
A. A. D'ANCONA, A.B., M.D., Professor of Physiology.

LECTURERS.

W. XAVIER SUDDUTH, M.A., M.D., D.D.S., Special Lecturer on Histology and Pathology.
CHARLES BOXTON, D.D.S., Lecturer on Mechanical Dentistry.
HARRY P. CARLTON, D.D.S., Lecturer on Operative Dentistry.
H. N. WINTON, M.D., Lecturer on Chemistry.

DEMONSTRATORS AND ASSISTANTS.

J. D. HODGEN, D.D.S., Superintendent of Infirmary.
HARRY P. CARLTON, D.D.S., Demonstrator of Operative Technic.
F. J. LANE, D.D.S., Demonstrator of Operative Dentistry.
EDWARD N. SHORT, D.D.S., Demonstrator of Operative Dentistry.
CHARLES BOXTON, D.D.S., Demonstrator of Mechanical Technic.
M. F. GABBS, D.D.S., Demonstrator of Continuous-Gum Work.
S. A. HACKETT, D.D.S., Demonstrator of Mechanical Dentistry.
W. F. SHARP, D.D.S., D.M.D., Instructor in Anesthesia.
F. O. JACOBS, Instructor in Microscopic Technic.
CHAS. E. POST, D.D.S., Demonstrator of Mechanical Dentistry.
HAROLD L. SEAGER, D.D.S., Demonstrator of Mechanical Dentistry.
J. T. ROWAND, D.D.S., Demonstrator of Crown- and Bridge-Work.
JOHN H. BARBAT, PH.G., M.D., Demonstrator of Anatomy.
O. W. JONES, M.D., Assistant Demonstrator of Anatomy.
J. D. HODGEN, D.D.S., Assistant in Metallurgy.
H. D. NOBLE, D.D.S., Demonstrator of Orthodontia Technic.

CLINICAL INSTRUCTORS.

J. L. Asay, M.D.
F. W. Bliss, D.D.S.
Geo. H. Chance, D.D.S.
H. C. Davis, L.D.S.
Warren DeCrow.
A. O. Hooker.
W. B. Kingsbury.
H. E. Knox, D.D.S.
W. F. Lewis.
J. P. Parker, D.D.S.
W. E. Price, D.D.S.
F. J. Saxe, D.D.S.
Max Sichel.
E. L. Townsend, D.D.S.
L. Van Orden, M.D.
William Wood.

The eleventh session (1892) begins on Monday, June 6, and closes March 1, 1893, after which the regular sessions of this College will begin the first Monday in September of each year, and close May 31 following.

The established standard for admission is of the same grade as that required for entrance to the High Schools, with the addition of elementary Physics and Chemistry. (Latin, beginning with the twelfth session.)

Three full courses of study of nine months each are required for graduation.

The courses of study are graded, with examinations at the end of each year.

A course in Microscopic Technic is a requirement in both the Junior and Senior years.

The Infirmary is open all the year round, affording clinical facilities unsurpassed. For further information, address

L. L. DUNBAR, Dean,
500 Sutter Street,

or to COLLEGE OF DENTISTRY,
18 Taylor Street, San Francisco, Cal.

AMERICAN COLLEGE
OF
DENTAL SURGERY,

479 Wabash Ave., Chicago, Ill.

This College has recently passed into the hands of a syndicate of professional gentlemen of experience and reputation as operators and instructors in Dentistry.

WOMEN.

Women are admitted into this College on the same terms which govern the admission of men.

FACULTY.

JOHN S. MARSHALL, M.D., Dean, Professor of Oral Surgery and Pathology.
L. C. INGERSOLL, A.M., D.D.S., Professor of Dental Materia Medica.
R. F. LUDWIG, D.D.S., Professor of Clinical Operative Dentistry.
E. L. CLIFFORD, D.D.S., Professor of General Materia Medica and Therapeutics.
I. B. CRISSMAN, D.D.S., Professor of Operative Dentistry.
VIDA A. LATHAM, D.D.S., Professor of Histology and Bacteriology.
B. J. CIGRAND, D.D.S., Professor of Prosthetic Dentistry.
THOMAS G. RIX, D.D.S., Superintendent of Clinical Laboratory.
W. K. HARRISON, M.D., Professor of Anatomy.
WELLER VAN HOOK, M.D., Professor of General Surgery.
GEORGE LEININGER, M.D., Professor of Anesthesia.
W. M. TANQUARY, M.D., Professor of Anatomy.
T. B. WIGGIN, M.D., Professor of Physiology.
H. D. COGHLAN, LL.D., Professor of Medical Jurisprudence.

An able corps of Clinical Instructors is provided.

This College has accepted the requirements of the National Association of Dental Faculties with regard to admission and graduation of students.

SPRING COURSE.

The Spring Course will begin on the First Monday in April, and continue until the First o July.

REGULAR WINTER COURSE

Will commence on September 22, 1892, and continue until March 22, 1893.

CLINICAL PRACTICE.

The Clinical Operating Rooms are open throughout the year. Experienced and competent instructors are always present.

GRADUATION IN MEDICINE.

By an arrangement with the College of Physicians of Chicago, Ill., such students as are found qualified and desiring to do so can obtain the two degrees in Dentistry and Medicine in four years.

FEES.

Spring Term, $25, which will be deducted from the fee of the following Winter Term.

Winter Course, $100. This includes all Laboratory Fees, Dissections, and Dissecting Material. No Diploma Fee is charged.

For further information, address

THEO. MENGES, Secretary,
479 Wabash Ave., Chicago, Ill.

BOSTON DENTAL COLLEGE.

563 TREMONT STREET.

1892-93.

FACULTY.

JOHN A. FOLLETT, A.M., M.D., Professor of Anatomy and Physiology.
STEPHEN P. SHARPLES, S.B., Professor of Chemistry, Physics, and Metallurgy.
EDWARD W. BRANIGAN, D.D.S., Professor of Clinical Dentistry.
JOS. KING KNIGHT, D.D.S., Professor of Dental Art and Mechanism.
GEORGE F. EAMES, M.D., D.D.S., Professor of Pathology and Therapeutics.
HERBERT L. SMITH, A.B., M.D., Professor of Principles and Practice of Surgery.
JAMES H. DALY, D.D.S., Professor of Operative Dentistry.
GEORGE A. BATES, D.D.S., Professor of Dental Histology and Microscopy.

EDWARD W. BRANIGAN, D.D.S., Professor in Charge.

CLINICAL INSTRUCTORS.

E. V. McLEOD, D.D.S.
S. C. INGRAHAM, D.D.S.
WM. RICE, D.D.S.
F. M. HEMENWAY, D.D.S.
J. B. GILLON, D.D.S.
J. R. PIPER, D.D.S.
L. S. BREED, D.D.S.
G. H. PAYNE, D.D.S.

MELVILLE BRYANT BUCKLEY, D.D.S., Demonstrator in charge of Mechanical Department.

WILLIAM A. WHITE, M.D., Lecturer on Materia Medica.
WILLARD A. CURRIE, D.D.S., Instructor in Carving.
STEPHEN P. SHARPLES, S.B., Librarian.

The year begins on the first Monday in September and ends on the third Wednesday in June.

It is the object of the Faculty to present a complete course of instruction in the theory and practice of Dentistry; for this purpose a well-appointed laboratory and infirmary are provided, at which there is an ample number of patients, insuring to all students abundant opportunities for operating at the chair and becoming by actual practice familiar with all the operations demanded of the dentist.

The Laboratory and Operating Room are open at 9 o'clock A.M. Demonstrators are present daily during working hours.

Students who began their professional studies elsewhere may be admitted to advanced standing. No student can advance with his class or be admitted to advanced standing until he has passed the required examination on the studies of the previous year.

Every candidate for the degree must have passed a satisfactory examination in every one of the departments of dental instruction at regular periods of the College course.

All candidates for admission are required before examination to produce certificates of good moral character, and students from other colleges are required to bring certificates from those colleges of honorable dismission. For admission they must present a degree in letters, science, or medicine from a recognized college or scientific school, or pass an examination in the following subjects:

1.—ENGLISH. Every candidate will be required to write legibly and correctly an English composition, and also to write English prose from dictation.

2.—PHYSICS. A competent knowledge of physics. (See Balfour Stewart's "Elements of Physics.")

Candidates from foreign countries must be able to speak the English language.

FEES AND EXPENSES.

For Matriculation	$5.00
For a year	100.00
For Demonstrator's Ticket (Anatomy)	5.00

There is no Diploma Fee and no Fee for Graduation.

For further information address

J. A. FOLLETT, M.D., Dean,

Hotel Nightingale, 637 Dudley St., Boston, Mass.

New York

College of

Dentistry,

205-7 East Twenty-third Street,

NEW YORK, U. S. A.

Collegiate year March 1 to March 1.

Infirmary Course of Practical Dental Surgery
March 1 to October 1.

Fall and Winter Session

of Lectures and Clinics, with Infirmary practice,

October 1 to March 1.

For Catalogue or other information, address

FRANK ABBOTT, M.D., Dean,

22 West Fortieth Street.

Pennsylvania College of Dental Surgery,

Twelfth Street, between Market and Arch, corner Filbert.

THIRTY-SEVENTH ANNUAL SESSION, 1892-93.
OPENS OCTOBER 1, 1892.

FACULTY AND AUXILIARY INSTRUCTORS.

J. EWING MEARS, A.M., M.D., Professor of Anatomy and Surgery.

C. N. PEIRCE, D.D.S., Professor of Dental Physiology, Dental Pathology, and Operative Dentistry.

WILBUR F. LITCH, M.D., D.D.S., Professor of Prosthetic Dentistry, Materia Medica, and Therapeutics.

HENRY LEFFMANN, M.D., D.D.S., Professor of Chemistry and Metallurgy.

ALBERT P. BRUBAKER, M.D., D.D.S., Professor of Physiology and General Pathology.

ALONZO P. BEALE, D.D.S., Lecturer and Demonstrator of Prosthetic Dentistry.
PERCIVAL E. LODER, M.D., D.D.S., Demonstrator of Anatomy.
G. W. WARREN, D.D.S., Chief of the Clinics and Demonstrator of Operative Dentistry.
I. N. BROOMELL, D.D.S., Demonstrator of Prosthetic Dentistry.
ALEX. P. LONG, D.D.S., Demonstrator of Operative Dentistry
E. T. DAVIS, D.D.S., Demonstrator of Operative Dentistry.
WILLIAM BEAM, A.M., Demonstrator of Chemistry.
J. HOWARD GASKILL, D.D.S., Demonstrator of Prosthetic Dentistry
FREDERICK R. BRUNET, D.D.S., Demonstrator of Prosthetic Dentistry.
I. V. MERSHON, D.D.S., Demonstrator of Operative Dentistry.
E. A. KRETSCHMAN, Demonstrator of Modeling.
W. K. THORPE, D.D.S., Demonstrator of Operative Dentistry.

CLINICAL INSTRUCTORS.

Dr. F. M. DIXON,
Dr. J. N. FARRAR,
Dr. W. G. A. BONWILL,
Dr. A. L. NORTHROP,
Dr. C. PALMER,
Dr. R. H. SHOEMAKER,
Dr. CHAS. F. BONSALL,
Dr. C. S. STOCKTON,
Dr. T. F. CHUPEIN,
Dr. W. H. TRUEMAN,
Dr. J. HAYHURST,
Dr. J. G. TEMPLETON,
Dr. W. R. MILLARD,
Dr. JOHN B. WOOD,
Dr. C. E. FRANCIS,
Dr. E. C. BAXTER,
Dr. A. H. BROCKWAY,
Dr. A. B. ABELL,
Dr. R. HOLLENBACK

This College has accepted the requirements of the National Association of Dental Faculties with regard to admission and graduation of students. (See announcement for 1892-93, which can be procured from the Dean.)

THE SPRING AND FALL SESSIONS.

THE SPRING COURSE commences on the second Monday in March and continues until the first of July. Fee, $50, which will be credited upon the fee for the regular session.

THE FALL COURSE will commence September 1, and continue until the first of October, and will be free to those who matriculate for the regular session.

Attendance upon the Spring and Fall Courses will be deemed equivalent to the term of pupilage under a private preceptor.

THE REGULAR SESSION

Will commence on October first, and continue until the first of March ensuing. Twenty lectures will be delivered each week on the various branches taught.

CLINICAL PRACTICE.

Lecture hours excepted, general clinical practice is available for the student continuously through the day, ten months of the year. Competent instructors are always present.

GRADUATION IN MEDICINE.

By an arrangement with Jefferson Medical College, such students as may desire to do so can, if found qualified, obtain the two degrees, in Dentistry and Medicine, in four years. Students desiring to graduate in medicine are required to notify the Dean of their intention at the beginning of their second course.

FEES.

Matriculation (paid but once)	$5.00
For each Course (Demonstrators' Ticket included)	100.00
Dissecting Fee	10.00
Diploma Fee	30.00

Board can be obtained at from $4.00 to $6.00 per week.

The Instruments and Tools required can be procured for from $35.00 to $45.00. This sum does not include the price of dental engine.

For further information, address

C. N. PEIRCE, D.D.S., Dean, 1415 Walnut St., Philadelphia.